Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

LY 17, 1944
LUME 33, No. 15

AMERICAN DYESTUFF REPORTER

UNIVERSITY OF NEBRASKA
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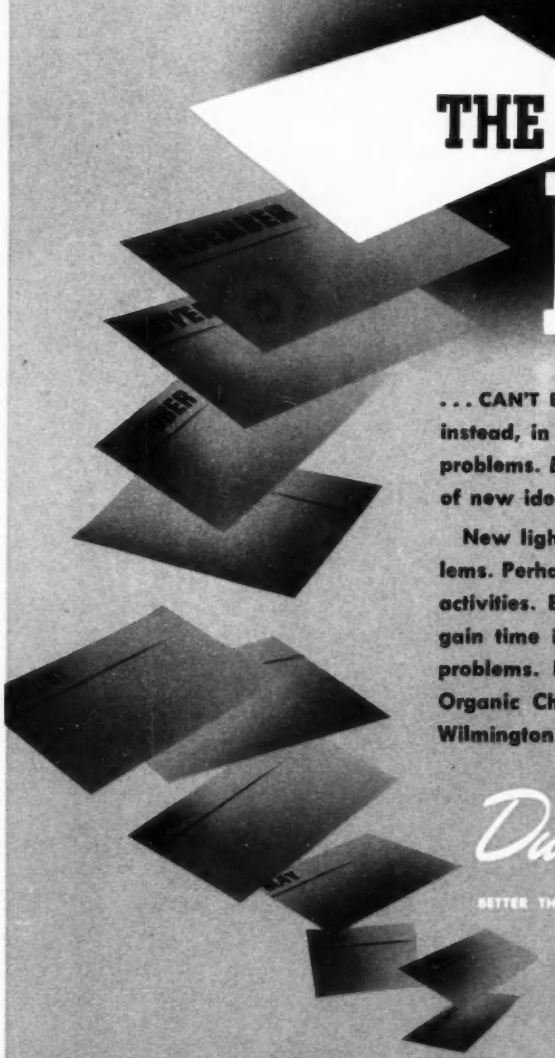
JUL 25 1944

THE 13TH MONTH



. . . CAN'T BE FOUND IN THE CALENDAR. Measure it, instead, in terms of the *extra* effort applied to your problems. *Extra* activity that is spurring development of new ideas.

New light is being brought to old and new problems. Perhaps this same light can be thrown on your activities. By enlisting our aid now, you may also gain time in solving some of your *postwar* dyeing problems. E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington 98, Delaware.

Du Pont Dyestuffs

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT DYESTUFFS
REG. U.S. PAT. OFF.

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

Durable Norane

PAT. REG.

✓ *Laboratory Certified for* **WATER-REPELLENCY**

✓ *Laboratory Certified for* **DURABILITY**

Warwick Chemical Company, makers of IMPREGNOLE repellents, now presents NORANE, a new durable repellent. Already millions of yards of NORANE processed fabrics are being used by the government for our armed forces. A limited supply for civilian use is now available. Your inquiries are respectfully solicited.

WARWICK CHEMICAL COMPANY

West Warwick, Rhode Island

580 FIFTH AVENUE, NEW YORK • ROCK HILL, S. C.

LEVELENE*

FREE FLOWING, NON-JELLING

More than a trade name.

A penetrant and levelling medium for direct, union, and CELANESE* dyes.

Effective either for stripping or for level dyeing when working with many of the vat type dyes.

A stable, dispersing penetrant for rotproof and mildewproof processing.

Economical and labor saving.

RATHER than ask for a laboratory sample—HAVE one of our technical men bring with him a sufficient quantity for a practical mill run. THEN judge for yourself as many mills have done and profited thereby.

*Reg. U. S. Pat. Off.

AMERICAN ANILINE PRODUCTS, INC.
50 UNION SQUARE — NEW YORK, N. Y.

— Dyestuffs —
Plant: Lock Haven, Pa.

BRANCHES

Providence, R. I.
55 Pine Street

Philadelphia, Pa.
210 N. 13th Street

Toronto, Can.
Dominion Anilines & Chemicals, Ltd.
265 Adelaide Street West

Boston, Mass.
190 High Street

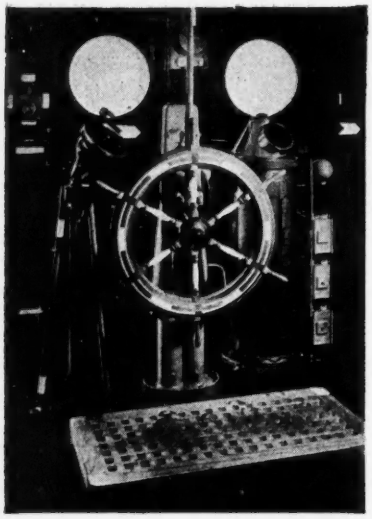
Chicago, Ill.
820 South Clinton Street

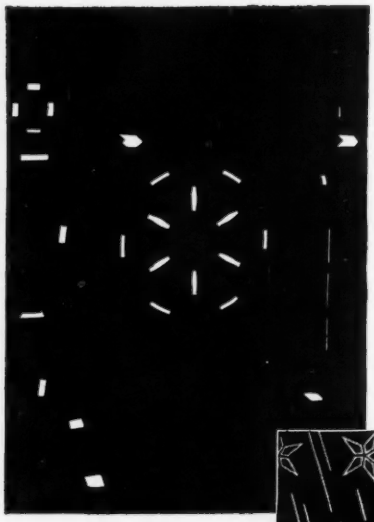
Charlotte, N. C.
301 East Seventh Street

Los Angeles, Cal. — 1019 South Grand Avenue

*Reg. U. S. Pat. Off.

American Dyestuff Reporter, Vol. 33, No. 15. July 17, 1944. Published every other Monday. Copyright 1944, by Howes Publishing Co., 440 4th Ave., New York, 16, N. Y. Domestic subscriptions, $5.00; Canadian, $6.00; Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y. Post Office, under the act of March 3, 1879.





PHOSPHORESCENT MARKING TAPE is used extensively aboard ship, applied as directional indicators to the walls of passageways, exits, messhalls, officers' and crews' quarters and engine rooms, and to mark and identify obstructions, fire-fighting stations, and other vital equipment. After activation by the ship's lighting, the tape "glows" in the dark, permitting movement aboard ship, and evacuation in the darkness in any emergency.

The photographs at the left show (extreme left) steering equipment marked with phosphorescent tape and (immediate left) how this tape "glows" in the dark.

Developed for War... Projected for Peace

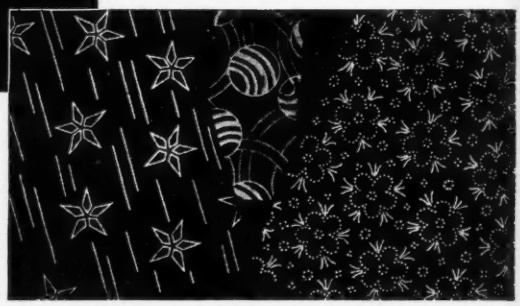
LUMINESCENT PIGMENTS

have been used extensively in a wide variety of war applications—phosphorescent marking tapes, signs, fluorescent maps, instrument dials and instruction plates, computers and charts, correction sheets, and the like. Many practical post-war applications are indicated, a few of which are illustrated on this page.

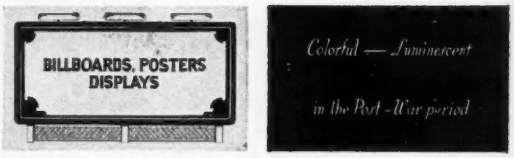
These pigments are no longer novelties at $30 per lb., but commercial products at down-to-earth prices of from 90c to $2.50 per lb., available in 16 grades and color types, for use in:

- *Paints and Lacquers*
- *Coated and Filled Paper*
- *Coated and Printed Textiles*
- *Plastics*
- *Printing Inks*
- *Decalcomanias*

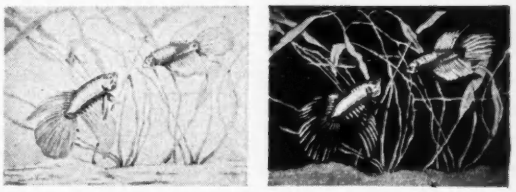
Our new booklet "The ABC of Luminescence" should suggest many ways in which these pigments can be used in your products of tomorrow. Your copy will be mailed to you on request.



LUMINESCENT TEXTILES in the form of draperies, lamp shades, etc. may help to decorate the post-war theatre, hotel room, cocktail lounge or home to permit movement in the dark.



THE POST-WAR BILLBOARDS, posters and displays may carry one message in daylight, a different luminescent one at night, or luminescent on-and-off flash effects in the dark.



COLORFUL, LUMINESCENT EFFECTS (painted, printed, plastic) for interior decoration in semi-darkness, as illustrated above (left) in daylight, and (right) taken in the dark.

New Jersey Zinc

PHOSPHORESCENT TRADE-MARKS, or name plates on your products "glow" in the dark, leaving a lasting impression on consumers' minds.

PHOSPHORESCENT SIGNS (plastic, painted, printed) give directional or instructional guidance in the dark in the event of power failure or emergency. Photographs: (1 & 3) taken in white light, and (2 & 4), photographed in the dark.

New Jersey Zinc

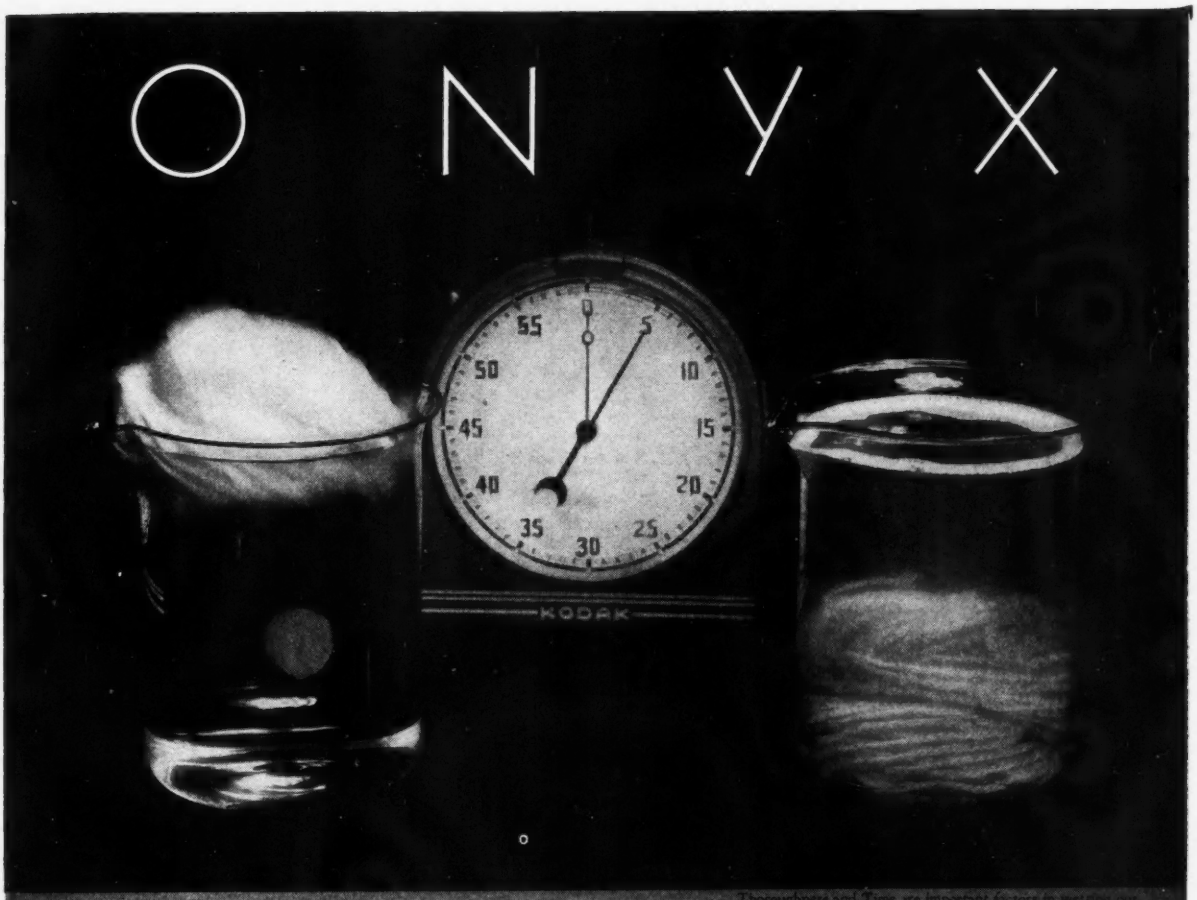
DEVELOPMENT PRODUCTS DIVISION

THE NEW JERSEY ZINC COMPANY

160 FRONT STREET • NEW YORK 7, N. Y.

Chicago • Boston • Cleveland • San Francisco

ONYX



Thoroughness and Time are important factors in wetting out

WETTING OUT

Thoroughness and Time are factors in determining the potency of a wetting out agent. An efficient agent, such as Phi-Φ-Sol, produces almost instant wetting and penetration of liquids into material exposed to its solution. Phi-Φ-Sol produces a uniformity of application and distribution of the liquor into even the most compact bundles of yarns or fabrics. Level dyeing, sizing and finishing applications are obtained efficiently and economically from Phi-Φ-Sol solutions.

onyx

Your inquiries are solicited

ONYX OIL & CHEMICAL COMPANY

JERSEY CITY, N. J.

PROVIDENCE • CHARLOTTE • CHICAGO • LOS ANGELES • TORONTO • MONTREAL

IT'S UP TO YOU!

See those stockings . . . they may be rayon, cotton, or lisle, but if they're not made to last . . . if they don't have that proper soft, clear stitch and smoky, eye-caressing dullness . . . they're "out"!

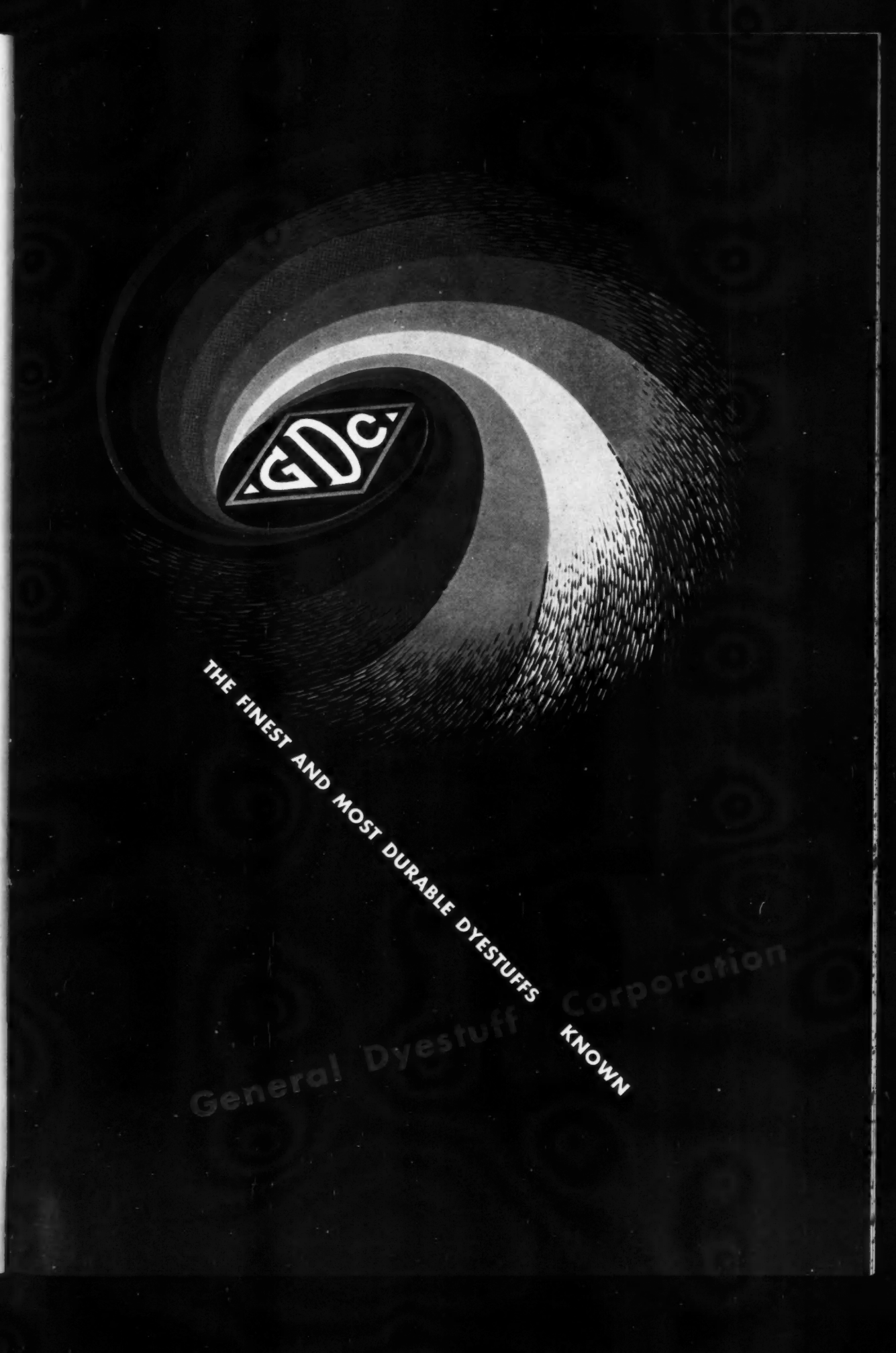
Yes, it's no news that these days with women more exacting and materials more varying than ever before, improper finishing can break even the strongest brand name.

For months our staff has been working "'round-the-clock" to develop formulae for handling all types of problem-materials. That's why a talk with one of our field men, can help you, as it has helped others, to make "lasting" hose, finished the Fanco way.

W. F. FANCOURT & COMPANY

PHILADELPHIA, PA.

Solving Finishing Problems Since 1904
In the South, Howard A. Virkler, Greensboro, N. C.


GDC
THE FINEST AND MOST DURABLE DYESTUFFS KNOWN
General Dyestuff Corporation

Smart! Why?

Because it was skillfully designed —executed with the finest of craftsmanship? Yes . . . but that's only part of the story! Unless the material from which this ski suit was made had been properly processed, the suit never would have had the style appeal that sold it. That's why so many leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

There is a C.P.P. soap or synthetic detergent for every fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for detailed information on the full line of C.P.P. processing agents made specially for the textile industry. Or, write to Industrial Department at Jersey City 2, N. J.

COLGATE-PALMOLIVE-PEET CO.

Jersey City, New Jersey — Kansas City, Kansas
Jeffersonville, Indiana — Berkeley, California

★ ★ ★

COLGATE KWIKSOLV — COLGATE FORMULA 25

BADGER FLAKES

COLGATE WHITE SOAP FLAKES — ARCTIC CRYSTAL FLAKES

DON'T WASTE SOAP... vital materials needed to win the war are used in making soaps.

Sulfur Compounds

from CARBIDE AND CARBON CHEMICALS CORPORATION

1 KROMFAX SOLVENT (Thiodiglycol)

$HOCH_2CH_2SCH_2CH_2OH$

Boiling point (50 mm.)	194° C.
Water solubility	Complete
Appearance	Almost colorless liquid
Odor	Mild
Availability	Commercial quantities

Kromfax Solvent has been used for many years as an almost non-volatile solvent for basic, acid, and vat dyestuffs. It is specially suitable for pasting difficultly soluble basic dyestuffs in direct printing and in color discharge and resist printing. Since Kromfax Solvent is a glycol and contains two alcohol groups, it may be useful in synthesizing resins and plasticizers.

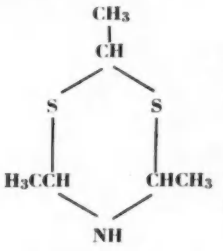
2 MERCAPTOETHANOL (Monothioglycol)

$HSCH_2CH_2OH$

Boiling Point (760 mm.)	157° C.
Water solubility	Complete
Appearance	Water-white liquid
Odor	Hydrogen sulfide
Availability	Research samples

Since Mercaptoethanol reacts both as a mercaptan and alcohol, it should be a particularly valuable chemical intermediate in the synthesis of pharmaceuticals, dyestuffs, rubber chemicals, flotation agents, and pickling inhibitors. Its fatty esters show promise as anti-crosslinking directors in the polymerization of elastomers. Mercaptoethanol is also useful as a sulfhydryl reagent for protein investigation. Certain of its derivatives may be of interest in depilatories and hair-curling formulations.

3 THIALDINE



Melting point	39-41°
Solubility	Slightly soluble in water; soluble in alcohol, ether, and hydrocarbons
Appearance	Colorless, crystalline solid
Odor	Ammonium sulfide
Availability	Commercial quantities

Containing both sulfur and nitrogen in the ring, Thialdine is a promising heterocyclic intermediate. The odor of its salts is less than that of the free base. Manufacturers of dyestuffs, insecticides, pharmaceuticals, and rubber chemicals should investigate this unusual chemical, available for the first time in commercial quantities.

BUY UNITED STATES WAR BONDS AND STAMPS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

"Kromfax" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

This

BECCO

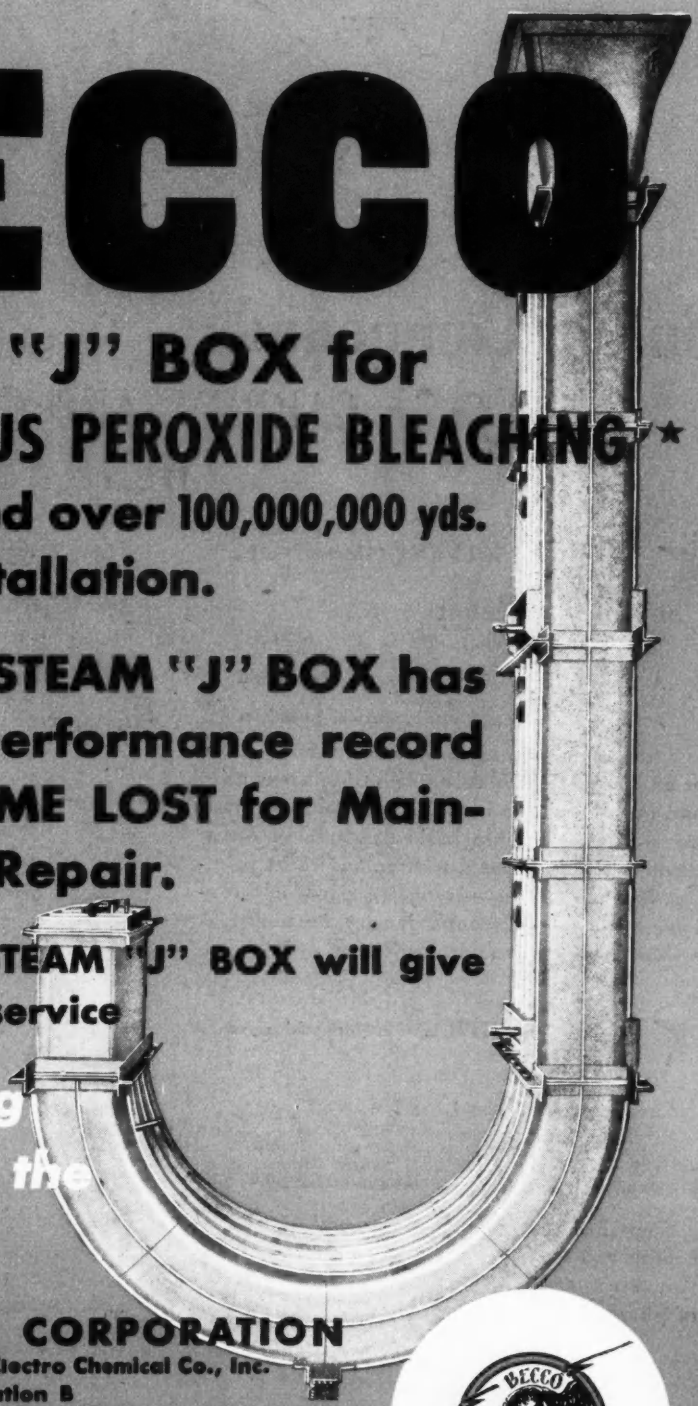
STEAM "J" BOX for CONTINUOUS PEROXIDE BLEACHING ★

has bleached over 100,000,000 yds. since its installation.

This BECCO STEAM "J" BOX has a perfect performance record with NO TIME LOST for Maintenance or Repair.

Every BECCO STEAM "J" BOX will give you the same service

"Nothing Moves but the Cloth"



BECCO SALES CORPORATION

Agents for Buffalo Electro Chemical Co., Inc.
Station B
Buffalo 7, N. Y.

New York Boston Philadelphia Chicago Charlotte

★ Covered by U. S. and Foreign Patents

G.I. NOW... but just wait

The Invasion is on!

Out of the sky float myriads of vari-colored supply parachutes, dropping food, ammunition, guns, all the sinews of war. And those parachutes are made of rayon—the very same rayon that might have gone into your linings and undies, dresses and gowns.

We at Industrial are proud that the quality of our famous "Continuous Process" *Spun-lo Yarn—its uniformity, strength and knot-free characteristics—recommended it to Uncle Sam's technicians for such vital tasks. They're the very same characteristics that recommend it so highly for the products of peace. When peace comes, *Spun-lo will be mustered out, and then, lovely fabrics for you—some familiar, some as yet, unborn!

*Reg. U. S. Pat. Off.

Industrial RAYON CORPORATION
MAKERS OF
Spun-lo RAYON YARN
BY THE Continuous Process

CLEVELAND, OHIO · NEW YORK OFFICE: 500 FIFTH AVENUE

You'll Find S/V Worstex Oils Aid Carding, Spinning ...Resist Discoloration

HERE ARE superior worsted oils which have been used for years and have proved their high quality and dependability in mills across the U. S. A. These oils not only have high resistance to oxidation and discoloration, but they also have superior carding and spinning properties. Read the list at the right for a summary of these benefits.

Get full details on the use of S/V Worstex Oils from your Socony-Vacuum representative.

FOR CARDING

Excellent penetrating, spreading and lubricating qualities. Freedom from gum-forming tendencies. Helps reduce fibre breakage and increase card runs.

FOR DRAWING & GILLING

Uniform drawing and gilling. Cleaner drawing rolls—more continuous operation—greater production.

FOR COMBING

Greater average fibre length. Uniform and light color of the oil, high resistance to oxidation, insures lofty, white, odorless tops even after long storage.

FOR SPINNING

Improves spinning, particularly on long-draft, high-speed running frames. Reduces yarn waste. Increases yarn strength.

GET THE FACTS ABOUT ALL OF THESE PROCESS PRODUCTS FOR TEXTILE MILLS:

GARGOYLE WOOLREX OILS: Self-emulsifying wool oils. Excellent qualities for carding, spinning and scouring.

S/V FABRISEC AA AND MP: Highly concentrated. Provide maximum water repellency with minimum amounts.

S/V WORSTEX OIL: Self-emulsifying oil, resistant to oxidation and easily scoured. Recommended for French-type worsted weaving yarns.

S/V TEXTILE FINISHING OIL: Many applications, including warp sizing, plain softening, starching and pre-treatment of cotton cloth before Sanforizing or Pre-shrinking.

S/V RAYON SOAKING OILS: Used with gelatins and glues for soaking viscose, other rayon yarns.

S/V FIBRE OIL A: Particularly adaptable for batching cordage fibre. (Jute, sisal, hemp, etc.)

SOCONY-VACUUM OIL CO., INC.

26 BROADWAY, NEW YORK 4, N. Y.

Process Products
SOCONY VACUUM

Standard Oil of New York Division
White Star Division • White Eagle Division
Chicago Division • Lubrite Division
Wadhams Division
Magnolia Petroleum Company
General Petroleum Corporation of California

These products available subject to national wartime requirements

Can You use these Hooker Chemicals to meet Shortages?

Here are four Hooker chemicals that some dye chemists are finding very helpful in these days of shortages. Perhaps they can find a place in your production program and relieve you of some of your worries. All are available in quantity and you can use them with full assurance that they are not likely to become critical. A request on your letterhead will bring samples of any Hooker chemical.

Metanitrobenzoyl Chloride, $C_6H_4NO_2COCl$, a yellow to brown liquid partially crystallized. It is a mixture of isomers, mostly meta. It is soluble in ether and reacts with water and alcohol. Boiling range at 760 mm. is 275°C to 278°C; at 18 mm. is 154°C to 155°C. Last crystal point 28°C to 31°C.

Shipped in aluminum cans containing 70 lbs. and ternplate pails containing 50 lbs.

Paranitrobenzoyl Chloride, $C_6H_4NO_2COCl$, a yellow crystalline lump material with characteristic odor. It is soluble in ether and decomposes in water and alcohol. It contains 95% min. of Paranitrobenzoyl Chloride by weight. Minimum melting point 70°C. Boiling range at 15 mm. 150°C to 152°C; at 105 mm. is 202°C to 205°C.

Shipped in 5 gallon wide mouth glass bottles containing 37 lbs.

2:5 Dichlor Aniline, (1-Amino-2, 5-Dichlorbenzene), $C_6H_3Cl_2NH_2$, a brown crystalline solid, soluble in alcohol and ether and slightly soluble in water. It has a minimum melting point of 48°C.

Shipped in fibre drums containing 225 lbs.

Chlor Anisidine, (1-Methoxy-2-Amino-4-Chlorbenzene), $NH_2C_6H_3ClOCH_3$, a gray crystalline solid soluble in alcohol and ether and insoluble in water. Melting point 79°C or higher.

Shipped in fibre drums containing 200 lbs.

Other Hooker chemicals used extensively in dyeing and textile industry include:

Catalysts

Aluminum Chloride, Anhydrous
Antimony Trichloride, Anhydrous

Dye Manufacture and Intermediates

Benzal Chloride
Benzoyl Chloride
Benzyl Chloride
Benzotrichloride
Monochlorbenzene
Monochlortoluene
Orthodichlorbenzene
Phosgene

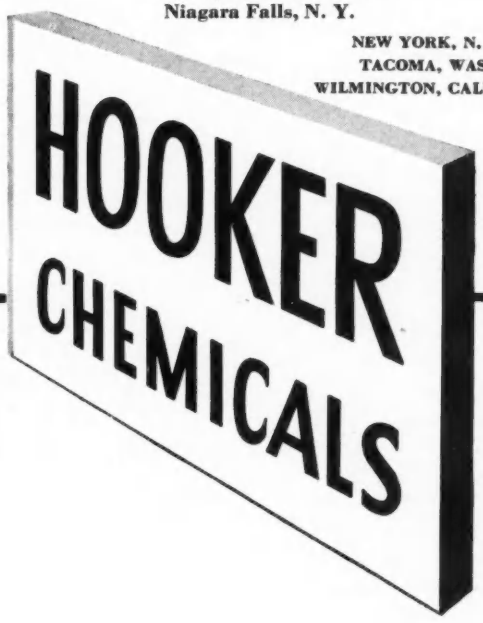
Chlorinating Agents

Sulfuryl Chloride
Thionyl Chloride

Write for the complete list of Hooker chemicals, among which you may find those that are the answers to your particular problems.

HOOKER
ELECTROCHEMICAL COMPANY
2 Forty-seventh Street
Niagara Falls, N. Y.

NEW YORK, N. Y.
TACOMA, WASH.
WILMINGTON, CALIF.



ARMY E NAVY

CAUSTIC SODA **LIQUID CHLORINE**
MURIATIC ACID **PARADICHLORBENZENE**
SODIUM SULFHYDRATE **SODIUM SULFIDE**

Let LANITOL Do it

Reg. U.S. Pat. Off.

SUPERIOR SYNTHETIC DETERGENT

A highly efficient product for use in scouring and boiling off all textile fibres. Active in hard or soft water it may be used alone in the bath or in conjunction with soaps or alkalies with amazing results.

- Let LANITOL increase the detergent action of your soap and achieve cleaner stock, yarn or cloth through its rapid and complete rinsing properties.
- Let LANITOL improve the boiling off, processing and dyeing of rayon hose in one or two bath methods. A better finish and uniform shade is easily accomplished.
- Let LANITOL prove its value for washing off worsted tops and yarn to remove all oil and grease.
- Let LANITOL demonstrate its ability to thoroughly scour rayon and woolen cloth and effectively remove all residual soap, dirt, etc. in the rinse, leaving the cloth with a pleasing hand and free from objectionable odors.
- Let LANITOL raise the efficiency of your fulling operation—a small addition to the soap liquor increases its penetration and activity when applied to the cloth in the mill and accelerates the fulling action.

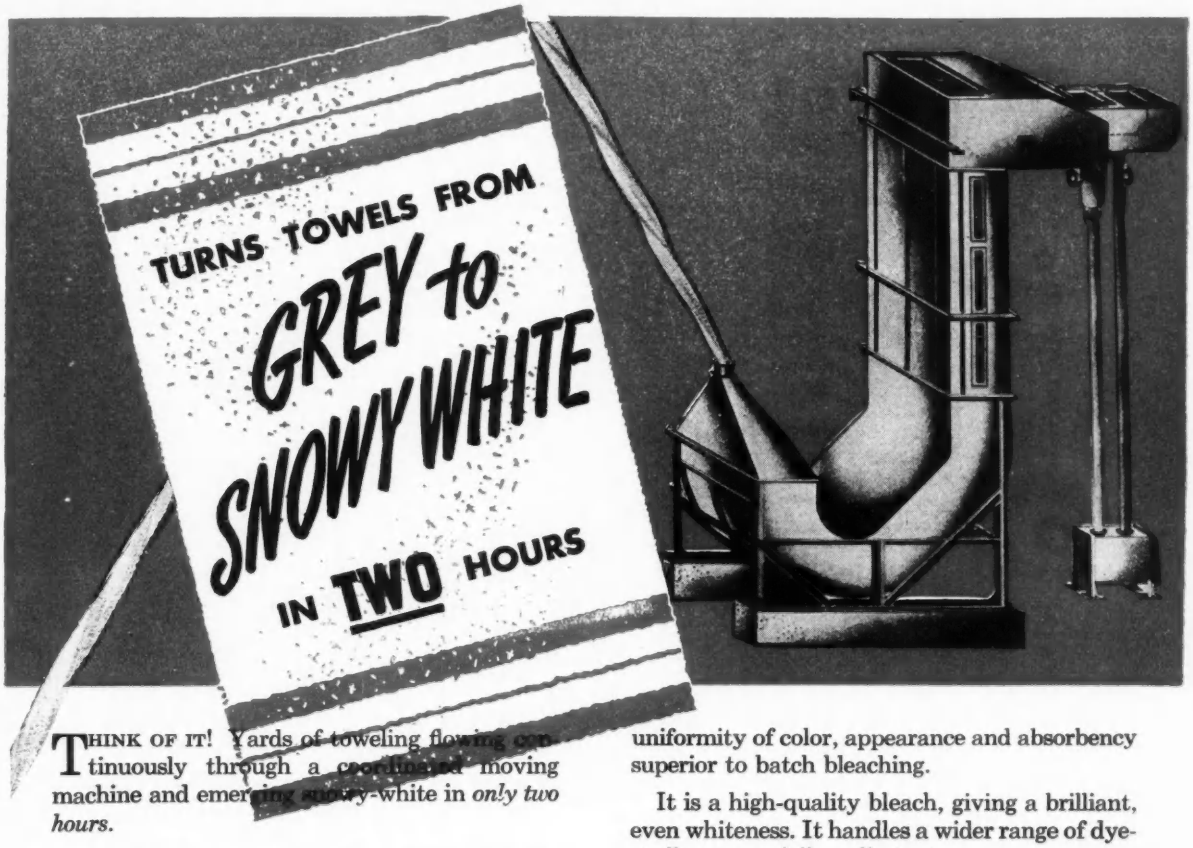
Sample or demonstration furnished on request.

ARKANSAS CO., INC.

Newark, New Jersey

Manufacturers of Industrial Chemicals for over 40 Years

DUPONT *CONTINUOUS* PEROXIDE BLEACH



THINK OF IT! Yards of toweling flowing continuously through a coordinated moving machine and emerging snowy-white in *only two hours.*

This is a far cry from batch bleaching, with its time-lag of from eight to fourteen hours. Now, continuous bleaching becomes an integral part of the production line.

This process is the result of intensive research and development by Du Pont engineers. Successful operation at a number of leading mills has now proved it practical.

Besides saving time, Du Pont Continuous Peroxide Bleach saves in other ways . . . on steam, water, chemicals. The savings justify the investment required.

When changing from one fabric to another, only a simple adjustment is necessary. As material goes through the process, each yard is treated alike from start to finish. The result is a uniformity of color, appearance and absorbency superior to batch bleaching.

It is a high-quality bleach, giving a brilliant, even whiteness. It handles a wider range of dyestuffs successfully, eliminates many common imperfections, and reduces seconds and rejects to a minimum. The reason for this is the fact that all operations are easily controlled.

The necessary equipment—designed and patented by Du Pont—is built by recognized manufacturers of textile finishing machinery. For information on the use of peroxides in continuous bleaching, write E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington, Delaware.

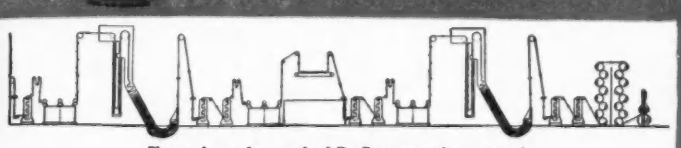
✓ THESE FEATURES

TWO-HOUR BLEACH — **HIGH QUALITY**
ECONOMICAL — **UNIFORM BLEACH**
FLEXIBLE — **CONTROLLED**
MINIMUM SECONDS AND REJECTS

DU PONT

DU PONT PEROXIDES

Better Things for Better Living . . . Through Chemistry



Flow plan of a typical Du Pont continuous unit

CAMEL DYES
for SERVICE-ABLE FABRICS

The experience of the Campbell organization, representing over 68 years of uninterrupted dyestuff service to the textile industry, is your assurance of uniformity in the Campbell Line of quality dyestuffs.

Whether for service fabrics or consumer demand, Camel Dyes are available . . . plus the usual prompt

"CAMPBELL SERVICE"

JOHN CAMPBELL & COMPANY, INC.

75 HUDSON STREET • NEW YORK CITY

TELEPHONE: BArclay 7-6228-6229

BRANCH OFFICES AND WAREHOUSES:

PHILADELPHIA BOSTON EAST CLEVELAND ATLANTA

LABORATORY CONTROL

Red oil soaps assure clean fabrics

Clean fabrics are a *must* for satisfactory dyeing. There can be no residue of oil, dirt, or even soap, to prevent level dyeing. Therefore, dyers and finishers are concerned about scouring effects, one important phase of which is the soap used.

Soaps made from red oil (oleic acid) are readily soluble and free rinsing at lower scouring temperatures. They are uniform because Emery Elaines are uniform. Their characteristics can be varied because Emery oleic acids are available over a wider range of titres and colors in distilled and saponified grades. Strong alkalies and prolonged boiling are not necessary for complete saponification.

Emery red oils, both distilled and saponified, are available for immediate shipment. Just let us know your specific requirements because we want to recommend a suitable grade and type for best results and greatest economy.

LABORATORY CONTROLLED THROUGHOUT PRODUCTION
EMERY INDUSTRIES INC.

EMERY INDUSTRIES · INC.

STEARIC ACID · OLEIC ACID · ANIMAL AND VEGETABLE FATTY ACIDS

4300 CAREW TOWER · CINCINNATI 2, OHIO

New York Office: 3002 Woolworth Building, New York City · New England Office: 187 Perry Street, Lowell, Mass.

...a good "break" for rayon

And we mean it two ways—a good break because continuous filament warps break clean under test after being sized with Houghto-Size—also a good "break" for the rayon mill because this superior size compound has what it takes to give you high quality, full-speed production.

HOUGHTO-SIZE provides better handle in the finished goods . . . it's highly concentrated, hence economical . . . it assures good weaving . . . is easily boiled out. To arrange for complete test, ask the Houghton Man, or write direct to E. F. HOUGHTON & Co., Philadelphia or Charlotte.

HOUGHTO-SIZE for rayon

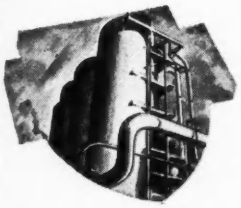
HOUGHTON TEXTILE AIDS

include:

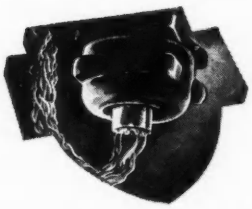
COTTON WARP SIZES
RAYON OILS
SOFTENERS
WORSTED SIZES
WETTING AGENTS
DETERGENTS
LUBRICANTS

GENERAL CHEMICAL

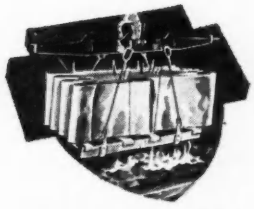
AGAIN GENERAL CHEMICAL CREATES NEW FACILITIES FOR SULFURIC ACID TO SERVE AMERICAN INDUSTRY



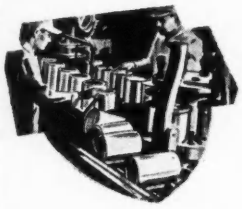
Petroleum
Alkylation, sulfonation, and improving color, odor, and stability of petroleum products.



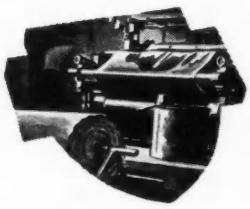
Rayon
Used in the spinning bath in rayon manufacture.



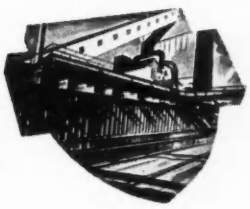
Steel
For pickling of steel sheets and castings; removes oxides and scales.



Paints
Raw material in production of pigments; for sulfonating drying oils.



Sulfonation
Sulfonating vegetable oils for water, fire, and mildew-proofing fabrics and textiles.



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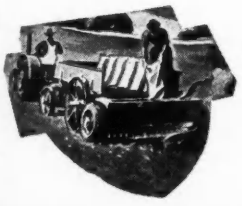

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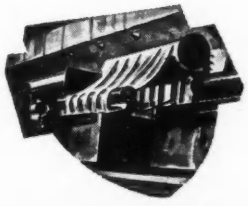

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JULY 17, 1944

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"Sitting Ducks" for Snipers

Against the jungle background, the white underwear of the first American Troops in the South Pacific, made them "sitting ducks" for Jap snipers.

For quick protection they resorted to homemade dyes concocted from coffee grounds, root juices . . . anything to simulate O.D. camouflage. Soon direct dyes were made available for re-dyeing in emergency field equipment, in Army mobile laundries, aboard ship. All old-issue "whites" were quickly made inconspicuous . . . even the traditional white of the nurses uniforms gave way to low-visibility olive drab. Thereupon, the QMC made O.D. the official shade for all G.I. underwear.

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AMERICAN
DYESTUFF REPORTER
VOLUME 33 JULY 17, 1944 NUMBER 15

MEASUREMENT OF WOOL FINENESS

H. J. WOLLNER, LOUIS TANNER and H. H. SPIEGEL
Bureau of Customs, U. S. Treasury Department

THE determination of the dimensions of small objects by measurements on their enlarged projected images is a well-known technique that has found many applications. It is especially advantageous when numerous measurements must be made, since it is easier, more expeditious, and less tiring to apply a scale to the projected image than to adjust the stage so as to properly locate the object on the scale of an ocular micrometer.

The type of scale used in measuring a projected image depends on the size and nature of the object, the use to which the measurements are to be put, and the degree of accuracy required. For some purposes simple comparison of the image with squares of known dimension ruled on the screen is sufficient to classify the particles (1). Frequently, the application of an ordinary rule is satisfactory. For materials having a wide range of particle sizes of which the mean and dispersion must be accurately known, a measuring device of high precision and capable of speedy manipulation is essential.

An important example of the latter case is the measurement of wool fibers for the determination of fineness. The official grade requirements of wool between 80's and 50's (2, 3) are based on the average fiber width (or diameter), the minimum percentage of fine fibers, and the maximum percentage of coarse fibers. Similar requirements have been proposed (3) for wools coarser than 50's. The need for precision and speed in measurement is obvious from the following facts. Individual fiber widths within a grade may vary between 10 and 70 microns, whereas the range of the average width in a grade is only 1.6 microns. To achieve the necessary sampling precision a large number of fibers must be measured per specimen. The official specifications require a minimum of 400 for the finer, more uniform wools, 1600 for the coarser, less uniform wools. The number of specimens to be tested in a lot is specified as one for each 20,000 pounds of scoured wool, not to exceed five specimens per lot. Hence, the determination of the fineness of a large lot of coarse wool may require as many as 8000 fiber measurements.

The most satisfactory scale heretofore developed for measuring the width of wool fibers is the wedge ruler (Fig. 1) described by von Bergen (4,5). This consists of a strip of white cardboard on which is printed a series of inclined lines. The longitudinal image of the fiber is brought into a sharp focus on the ruler, which is then moved until the image is directly between two lines of the wedge. A mark is placed on the ruler at the point

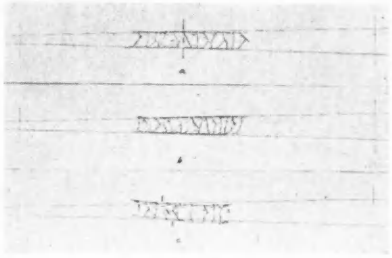

Fig. 1

TABLE I
Example of Calculation for Fineness*

Cell No.	*Cell Midpoint*	*Cell Boundary*	*Deviation in Cells from "A" x*	*Observed Frequency y*	*yx*	*yx²*	*Cumulative frequency percent*
6	13.75	12.5-15.0	0	2	0	0	0.1
7	16.25	15.0-17.5	1	7	7	7	0.6
8	18.75	17.5-20.0	2	17	34	68	1.6
9	21.25	20.0-22.5	3	43	129	387	4.3
10	23.75	22.5-25.0	4	67	268	1072	8.5
11	26.25	25.0-27.5	5	110	550	2750	15.4
12	28.75	27.5-30.0	6	136	816	4896	23.9
13	31.25	30.0-32.5	7	140	980	6860	32.6
14	33.75	32.5-35.0	8	158	1264	10112	42.5
15	36.25	35.0-37.5	9	200	1800	16200	55.0
16	38.75	37.5-40.0	10	166	1660	16600	65.4
17	41.25	40.0-42.5	11	154	1694	18634	75.0
18	43.75	42.5-45.0	12	133	1596	19152	83.3
19	46.25	45.0-47.5	13	90	1170	15210	88.9
20	48.75	47.5-50.0	14	77	1078	15092	93.8
21	51.25	50.0-52.5	15	47	705	10575	96.7
22	53.75	52.5-55.0	16	25	400	6400	98.3
23	56.25	55.0-57.5	17	14	238	4046	99.1
24	58.75	57.5-60.0	18	8	144	2592	99.6
25	61.25	60.0-62.5	19	3	57	1083	99.8
26	63.75	62.5-65.0	20	1	20	400	99.9
27	66.25	65.0-67.5	21	1	21	441	99.9
28	68.75	67.5-70.0	22	1	22	484	100.0
		Total		n 1600	14653	15306	
		Divided by n			E_1 9.1581	E_2 95.6631	

A = midpoint of cell No. 6 = 13.75 microns. m = units per cell = 2.5 microns
Mean width = $A + mE_1 = 13.75 + 2.5 \times 9.1581 = 36.65$ microns
Standard deviation = $m \sqrt{E_2 - E_1^2} = 2.5 \sqrt{95.6631 - (9.1581)^2} = 8.58$ microns
* Based on official method of U. S. Dept. of Agriculture (2) and A.S.T.M. (3)

Fig. 2

where the wedge has the same width as the image. From the known magnification of the projection and from the dimensions of the scale the width of the fiber can be established. Individual numerical readings are not taken, however, since it is more expeditious to record the widths of 100 fibers at the appropriate places on the ruler, divide the wedge into "cells" of equal length, count the marks in each cell, and compute the mean and distribution measure by simple well-known statistical methods (3) (Table I).

Despite the increased speed resulting from the use of the wedge ruler method of test is too time-consuming to be practical for routine work. An experienced operator can, on the average, measure about 100 fibers in 15 minutes. The alternative official cross-section method (2,3), wherein the major and minor diameters are measured by a similar procedure, is not more rapid and has been criticized on other grounds (7). As a result, routine commercial tests are usually limited to the measurement of only 100 or 200 fibers, precision being sacrificed in favor of more speedy results.

There are described below two modifications of the width method of determining wool fineness which greatly increase the speed and precision of measurements. The modifications are in the nature of the slide prepared for the projection of longitudinal fiber images, and in the use of a new improved device for making the measurements.

SHORT FIBER LENGTH SLIDES

The standard procedure for preparing slides for projection of longitudinal images is simple (2,3). A small strand of fibers approximately ½″ in length is spread across a glass slide, mounted in glycerol, and covered with a glass. Unless painstakingly separated and aligned, the fibers on such a slide are interlaced in a web, crossing each other and curling in all directions. As a result they are distributed in a height far beyond the depth of focus of the optical system. Hence, only a single fiber or portion thereof can be in focus at one time. After each measurement the operator must refocus on another fiber. This repeated interruption of the measuring operation not only consumes time but also tires the analyst, with the result that precisions are lowered and more frequent rest periods become necessary.

This particular disadvantage would to a large extent be overcome if the fibers were all in a single plane and closely grouped. It has been found possible to approximate this condition closely by the use of fibers cut to very short lengths, about 75 microns. Such short fibers do not interlace; each can lie flat on the slide uninfluenced by curl, twist or crimp. They can be made to adhere to the glass so that addition of a liquid mounting medium will not cause them to float. The depth of the resultant single layer of fibers ranges only up to the diameter of the coarsest fiber in the specimen, say 80 microns. Usually, less than 5 per cent of the fibers exceed 50 microns. With an 8 mm. objective at a magnification of 500 the depth of focus is generally adequate to yield sufficiently sharp images of practically all fibers within a 4″ circle of projection, so that many measurements can be made after a single adjustment of the focus and stage (Fig. 2).

The following procedure has been found satisfactory in the preparation of short fiber slides for wool. By means of a Hardy or Schwarz thin cross-section device (6, 8) or similar instruments, a section is cut about 75 microns long, embedded in a thin film of collodion. The technique for making such sections is not difficult and has been described by Hardy and others (6, 8). The section is placed upon a glass slide and covered with a very small drop of butyl acetate. The bundle of fibers is carefully broken up with a steel needle and the fibers stirred. Spreading of the drop over too large an area should be avoided. During the evaporation of the solvent the slide is tapped continuously. When dry, the thin film of collodion firmly binds the fibers to the glass. Glycerine, cedar oil or other suitable mounting medium is placed over the fibers and the slide is completed in the usual manner.

A well prepared slide shows a compact single layer of short wool fibers (Fig. 2). A little practice in preparation is usually required to avoid scattering the fibers or, conversely, so crowding them as to cause piling up and crossing. The use of a dissecting microscope to observe the fibers during addition of the solvent and subsequent manipulations is advantageous.

Sections from a number of specimens can be combined on one slide. The total number of fibers required for a specimen of even the coarsest wools (1600) can be measured on a single slide prepared in this manner. The thorough mixing of the fiber particles in the drop of butyl acetate ensures proper randomization for sampling.

NEW PRECISION MEASURING DEVICE

The advantages of the wedge ruler have been mentioned previously. Of greatest importance is the automatic arraying of numerous measurements in a form enabling speedy calculation of the average and the distribution of fiber widths.

Experience indicates that the wedge ruler lacks several desirable characteristics. In Fig. 1(a) the fiber is of uniform width, and the points at which the inclined lines enter the image can be discerned without too much difficulty. Frequently, however, the boundaries of the image appear to coincide with the wedge over a considerable length (Fig. 1(b)). Attempts to overcome this difficulty by inverting the wedge ruler, or otherwise, are time-consuming. In routine work the operator usually places the mark somewhere along the doubtful length, guessing at the exact point; this practice, of course, adversely affects the precision.

Furthermore, there are no means with the wedge ruler whereby the specific section of the fiber normal to its length at

(Continued on Page 321)

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JULY 17, 1944

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DETERMINATION OF MERCURY

in Textiles Mildew-Proofed With Organo-Mercuric Compounds

(A communication to the A.A.T.C.C.)

D. A. SHIRAEFF

General Dyestuff Corporation

SINCE the beginning of the war, organo-mercuric compounds have been employed by the armed services as mildew-proofing agents in increasing quantities until their use has grown to their application on millions of yards of fabric.

It is not necessary to explain the desirability of accurate chemical analysis to check plant applications from the point of control, uniformity, and proper processing.

Any method of chemical analysis of this type of mildewproofing agent on the cloth logically resolves itself into the quantitative determination of the most tangible constituent of the agent, which in this case is metallic mercury.

Accepted but unofficial analytical methods have been developed, as a matter of necessity, and are in use with one or another variation in textile mills, control and development laboratories, and military depots throughout the country. Most of them have been open to objections on the ground that they are cumbersome at best and of questionable reliability at worst. All of the methods with which we are familiar call for preliminary destruction of the organic matter, the bulk of which is made up of the textile itself. Due to the volatility of mercury and its compounds, direct means for destroying the organic matter, such as ignition or even wet combustion with H_2SO_4 and HNO_3, cannot be used. The destruction of the organic matter, therefore, is accomplished by employing an oxidizing agent such as $KMnO_4$, H_2O_2, HNO_3, etc. at comparatively low temperatures. Such procedures on the one hand fail to destroy the organic matter completely and on the other hand, while freeing the mercury content from the organic matter, introduce still greater amounts of inorganic material, thus again reducing the proportion of mercury in the sample to an undesirably small amount. Furthermore, during the preparation of the sample for the final analysis, a number of manipulations are required, each of which is charged with a potential danger of losing the mercury by volatilization, absorption on inert material, incomplete precipitation, and simple mechanical loss.

Having failed completely in our attempt to modify the existing methods to a point where they would become more rapid and more easily workable, we succeeded in developing a new method which is based on somewhat different principles. The procedure for this method and the dicussion of its advantages over the older methods are given below.

REAGENTS

Dithizone Solutions: (Diphenylthiocarbazone)

Solution A 0.500 gm. in 250 cc. Chloroform

Solution B Solution A diluted with Chloroform 1:20

Mercuric Chloride:

Solution A 0.2708 gms. $HgCl_2$ plus 1 cc. Conc. HCl in 1000 cc. distilled water

This solution contains 0.2 mg. Hg′ per 1 cc.

Solution B 25.00 cc. of Solution A diluted with water to 500.0 cc.

This solution contains 0.01 mg. Hg′ per 1 cc.

Ether: Containing 2% of absolute alcohol and saturated with HCl gas.

STABILITY OF SOLUTIONS

Mercuric Chloride Solutions A and B should be kept in tightly-stoppered brown glass bottles. They should never be exposed to direct sunlight. On account of their tendency to form mercurous chloride, these solutions, as a precautionary measure, should not be used once they are over 48 hours old.

DITHIZONE SOLUTIONS A AND B

These solutions should also be kept in tightly-stoppered brown glass bottles, and, when not in use, they must be stored in a refrigerator. Under these conditions they can be kept indefinitely.

Solution B should be standardized not less than twice a week.

PROCEDURE

Weigh accurately 0.250 gm. of a mildew-proofed cloth which is shredded or cut in small pieces prior to weighing. Place the weighed-out cloth in a 25 x 200 mm. test tube and add 20 cc. of ether saturated with HCl. Allow to stand for 20-30 minutes with an occasional shaking. Then place the test tube in a pot with warm water and evaporate the ether practically to dryness. Do not allow ether to boil too violently. Add 5 cc. Chloroform, shake the test tube and add 10 cc. of distilled water. Titrate with *Dithizone Solution B.*

TITRATION

From an accurately graduated burette add about 1 cc. of Dithizone Solution B. Stopper the test tube with a tight fitting cork and shake the tube briskly. In presence of mercury, the chloroform layer will be colored bright orange. Keep adding Dithizone Solution B in 1.0 or 0.5 cc. portions with good shaking after each addition until the chloroform layer turns orange brown, after which the additions of Dithizone Solution B should be made very carefully (0.1 cc. at a time); and the color is examined by allowing the chloroform to settle and inclining the test tube into a horizontal position. The titration should be terminated when the chloroform acquires a slightly greenish dark brown color.

CALCULATIONS

cc. Dithizone Solution B used × "Factor A" × 100 = % of mercury on weight of sample.

STANDARDIZATION OF DITHIZONE SOLUTION B

Place in the same size test tube, as in previous titration, 20.00 cc. of *Mercuric Chloride Solution B:* add 5 cc. Chloroform and titrate this solution in exactly the same manner as above and to exactly the same end point.

20.00 cc. of $HgCl_2$ solution B contains 0.2 mg. Hg′

$$\frac{0.0002}{\text{cc. Dithizone Sol. B. used}} = \text{gm. of Hg′}$$

equivalent to 1 cc. — "Factor A" of Dithizone Solution B.

(Concluded on Page P315)

Effect of the Fiber pH on the LIGHT FASTNESS OF DYED COTTON*

C. A. SEIBERT and C. A. SYLVESTER

Organic Chemicals Dept., Dyestuffs Division, Technical Laboratory
E. I. du Pont de Nemours & Co., Inc.

AS the title implies, this is a report of experiments to learn if there is a difference between the light fastness of dyed cotton finished to retain a mild acid, and finished to retain a mild alkali.

The experiments demonstrate that there is an outstanding difference, and definitely sufficient in degree, to make important the control of the pH of the finished cloth when it is desired to obtain the maximum light fastness of the dyes. In the pH range between 3 and 5, the light fastness of cotton colored with many of the direct, developed and sulfur dyes, is definitely inferior to when the pH approximates, or is above 7. Cotton colored with azoic and vat dyes exhibits only minor differences under these conditions. At a pH between 8.5 and 9.5 cotton colored with the direct and developed dyes will exhibit between slightly superior and slightly inferior fastness depending on the dyes used, compared with when the cotton is at or below 7, the neutral point. With variations in pH between 7 and 9.5, cotton colored with azoic and sulfur dyes exhibits only minor differences in light fastness, except the sulfur blacks, which are consistently superior at the higher pH values. At the higher pH values, cotton colored with the vat dyes is outstandingly inferior to the cotton at or below 7, generally speaking. To emphasize that statement, we may say that vat dyed cotton in a mildly alkaline condition is outstandingly inferior in light fastness to that identical vat dyed cotton when it is either in a neutral or mildly acid condition.

This work has not disclosed that variations in the pH values of the finished cloth between 4 and 10 is responsible for the differences in chlorine fastness sometimes found in testing vat dyed cotton fabrics. While these experiments establish that the pH of the finished cloth influences the light fastness of the color, it does not establish that pH variations is the only condition that may exert such an influence.

These experiments were undertaken in an effort to learn why khaki and olive drab uniform and herringbone cotton twills, practical processed in different mills with vat dyes considered identical, varied rather widely in their fastness to weather, fastness to light and occasionally in their fastness to chlorine.

The final operation in the application of vat dyes to cotton is usually treatment at or near a boiling temperature, in a bath containing soap, to develop a stable color or shade and to remove imperfectly fixed or mechanically adhering dye. As a detergent, soap is more effective if used together with a mild alkali. This is probably the reason why some processors add sodium carbonate or some other alkali to the soap bath for finishing or developing vat dyed cotton.

A relatively large quantity of the vat dyed cotton that is processed for the armed services is treated after dyeing with a variety of substances to impart to the cotton some specific property, such as water repellency, protection against the destructive action of bacteria, molds, fungi, reduction in the fire hazard, etc. Naturally, these substances are applied under conditions that make them most effective and this is liable to leave the finished cloth varying in pH values. It is established that after these special treatments the color is occasionally found undesirably affected in fastness. This reduction in the color fastness is usually attributed to the substances that have been applied. The information developed by the present experiments indicates the possibility that this assumption, in respect to cause, may not be entirely correct. At this time these experiments have not included any work to establish the facts but it is planned to do that.

EXPERIMENTAL PROCEDURE

Cotton cloth was colored by normal procedure with a range of the direct, developed, sulfur, vat and a few azoic dyes and thoroughly rinsed before drying to leave the cotton in a neutral or very nearly neutral condition. After drying, the dyed cotton was divided into 3 individual pieces. One was preserved as the control and, in a dry condition, one each of the other two pieces was saturated with an 0.5 per cent solution of 99 per cent acetic acid and with an 0.5 per cent solution of a commercial grade of sodium carbonate. The surplus liquor was removed under conditions to permit the cloth to retain approximately its dry weight of the solutions and, without previous rinsing, it was dried in a hot air dryer at a temperature between 235 and 245° F. The pH values of the dry cloth, after lying in the air for at least several hours to condition, were determined with a Leeds and Northrup meter by procedure that is described later in this report. The values found were: of the control 6.7-7.2, of the acid treated 4.5-4.7 and of the alkali treated 8.7-9.3. All three pieces were then exposed together in a carbon arc fading lamp and a sufficient number were also exposed to daylight under glass and to weather to establish that the lamp produced results comparable with daylight and weather.

The pH of the acid and alkali solutions were 2.8 and 11, which may cause the thought that the quantities retained by the cloth is in excess of what may normally be expected in practical processing. However, 42 samples of vat dyed herringbone twill, representing practical production of 17 different mills, varied in pH between 6.6 and 9.45. Three were below 7, 15 between 7 and 8, 10 between 8 and 9 and 14 above 9. There has not yet been accumulated a sufficient number of samples practical processed with the other classes of dyes to include data on their pH values; however, it is established that some treatments to impart specific properties to dyed cotton are in baths with pH values as low as 4.

The light exposures illustrate that retention by 100 lbs. of vat dyed cotton of as small a quantity as 2.5 ozs. of a mildly alkaline soap is sufficient to reduce appreciably the light fastness of some of the dyes. A running warm water rinse of 10 seconds does not remove enough of this soap to eliminate entirely its undesirable influence and while the exact conditions required to do this were not established, enough work was done to indicate that rinsing in warm running water alone is probably impractical for economic reasons.

A possible remedy may be a buffering system to control the pH of the finishing baths within the limits desired. However, whether solutions of soap and of soap and alkali can be buffered within these

* Presented at meeting, Philadelphia Section, April 14, 1944.

limits without separation of the fatty acid was not determined in these experiments.

The question naturally occurs "in what form is the alkali in the cloth when it influences the light fastness." It does not appear to have combined chemically with either the dye or the cloth, because after the dyed cloth is aged for a least a month under normal room conditions with its original pH unchanged, rinsing in water will change the pH to approximately 7 and subsequent exposure to light demonstrates that its maximum light fastness has been restored. This experimental observation has been confirmed in practical processing several times. Vat dyed cotton rejected for unsatisfactory light fastness has been sufficiently improved by rinsing in water containing a small quantity of acetic acid, to be acceptable to meet the light fastness requirement for which it had been rejected. How acetic acid in the cotton acts under these conditions has not been determined.

A few experiments indicate that the presence in the dyed cloth of as much as 0.5 per cent common salt, sodium chloride or sodium acetate of its dry weight does not influence the light fastness of the vat dyes.

This report is probably of greater importance to direct attention to a condition that requires control than it is to establish the conditions for control, because at this time the work has not progressed to the point where it has determined the pH value required to obtain maximum light fastness of all dyes. However, it is clearly indicated that vat dyed cotton should not be finished in alkaline liquors unless the alkali is removed by rinsing or neutralization.

A knowledge of cause and effect usually suggests a remedy. In respect to vat dyed cotton, the results of the following experiments merit mention. Cotton colored with 12 different vat dyes by the pigment pad method was, after reduction and then oxidation with chrome and acetic acid, finished by treatment for 10 seconds at 180° F. in liquors described in the following tabulation which also describes the pH values of the finished dyed cotton.

0.4 gram per liter Retarder LA, dried without rinsing	7.0
rinsed for 5 seconds in warm running water	7.0
1.2 grams per liter MP-189, dried without rinsing	7.6
rinsed for 5 seconds in warm running water	7.0
0.8 gram per liter "Modinal" DN, dried without rinsing	7.5
rinsed for 5 seconds in warm running water	7.0
2.4 grams per liter soap, dried without rinsing	8.5
rinsed for 5 seconds in warm running water	7.6
2.4 grams per liter soap and 4.0 grams per liter sodium carbonate dried without rinsing	9.2
rinsed for 5 seconds in warm running water	7.8

The pH values are averages with maximum deviations of 0.4 plus or minus.

These substances, in the order named, are described in the 1943 Yearbook as an organic cationic product, a hydrocarbon sulfonate and a long chain alcohol sulfate.

The color fastness properties of all of these dyeings are similar, except for the light fastness, which of the first 6 is appreciably superior to the last 4 and similar to the last 4 when the latter are rinsed or neutralized to a pH of 7.0 before drying. While the shades of the first 6 dyeings of the individual dyes are acceptably similar for practical purposes, they are not identical with the last 4. The shades of the last 4 are not identical before and after neutralization. Surprising as it may be, it is a fact that some of the vat dyes that exhibit the best color fastness properties are noticeably different in shade when the pH of the cotton is 7 and when it is above 9.

Among the relatively small number of vat dyes included in these experiments, the following were found definitely inferior when the cotton had a pH of 9 or higher than when it was neutral.

Ponsols Browns AG and AR, Khaki 2G, Blues BCS and BF, Navy Blue RA, Green 2BL and Olives AR and G. Nineteen dyes of competitive manufacture that are considered by the trade as interchangeable with these du Pont vat dyes, were included in these experiments and found to act like the du Pont dyes.

Among the relatively small number of direct and developed dyes included in the experiments, the following were found definitely inferior at the higher pH values: Pontamines Fast Brown BRL, Green GX, Diazo Brown R and Diazo Black BHSW. Those found definitely inferior at the lower pH values are: Pontamines Brown NCR, Fast Brown BRL, Fast Black PG, Diazo Orange RFW, Diazo Brown R, Diazo Violet 2R, Diazo Blue NA, Sulfogene Direct Blue 2RCF and the Sulfogene Carbons.

While it is not yet established that the method used for the pH determinations is either ideal or absolutely accurate, it appears satisfactorily useful to determine the presence of either acid or alkali in undesirable quantity. The procedure is:

2.0 g. ± 0.1 g. of fabric is cut into small pieces. 100 cc. of distilled water (pH 6.5 ± 0.5) is placed in a glass stoppered flask and boiled two minutes. The material is then added to the flask and the flask immediately removed from the source of heat and stoppered. It is well shaken initially, and at frequent intervals during the cooling period of one hour. At the end of one hour, the pH of the water extract is determined at a temperature of 80° F. ± 5° F. by potentiometric methods. If sufficient material is available, several determinations should be made.

The Southern Regional Research Laboratory of the U. S. Department of Agriculture proposes a more elaborate method for greater accuracy. It is published in the Industrial and Engineering Chemistry, Analytical Edition, issue of October 15, 1943. This method is unquestionably useful for greater accuracy, but it is doubtful that for the present purpose such accuracy is required.

ANNUAL OUTING, PHILADELPHIA SECTION

THE Philadelphia Section held their Annual Outing on Friday, June 16, 1944 at Cedarbrook Country Club, which was attended by 448 persons, one of the largest gatherings for this section.

The Alban Eavenson Cup was won by Edward J. Smith with a low gross of 78. Joseph Newdeck was the guest winner with a 78 low gross. Quoits was won by B. Taylor and C. Ruth, with Mr. Maxwell and Mr. McCandless as guest winners. H. J. Higgenbottom and H. Gossen were first in pinochle. First prize in darts was taken by John Shafer and James Grey with G. Hoover and E. H. Hughes as guest winners.

The dinner was followed by the donation of prizes and delightful entertainment and a good time was had by all.

Respectfully submitted,

A. E. RAIMO,

Secretary.

SEPTEMBER MEETING, SOUTHEASTERN SECTION

AT the meeting of the Southeastern Section to be held on September 9th at the Callaway Auditorium, the executive committee on research will be special guests. A conducted tour through the Callaway Institute for members and guests has been arranged by Robert W. Philip for the afternoon before the dinner and meeting. Speakers and program for the meeting will be announced later.

Textile Schools and TEXTILE RESEARCH*

MALCOLM E. CAMPBELL
Dean, Textile School, North Carolina State College

MUCH is being said, and a great deal more is being written these days, about the need for research in the textile industry. Call it propaganda if you like, —no doubt the primary purpose of much of it is to convince the uninformed or ultra-conservative heads of some industrial firms that they can ill afford to refrain any longer from spending a dollar or so for research. The discussion that is to follow was not designed to convince anybody of anything,—it is merely an attempt to illuminate a certain aspect of the subject that might reasonably be expected to be of interest to the membership of an organization of this kind.

No matter what phase of research a discussion may involve, it is usually necessary to spend considerable time in painting in the background. If my remarks were being directed at a group less cognizant of the value of research, I would have to compare the history of the age-old textile industry with those of some of the upstarts like radio, aviation, and the like. It might be necessary to touch upon some of the new and very dramatic offspring of research, such as penicillin, DDT, and other things that are still spoken of in hushed tones and with furtive glances. Or I might even feel called upon to speak in terms of the hard cash saved by research, as for example the estimated saving of a quarter of a billion dollars annually in England alone resulting from Langmuir's development of the gas-filled lamp.

Fortunately, however, because of the long-established and excellent research program of the A.A.T.C.C., there is no need for me to attempt to "sell" textile research to this group, and so I feel that my task is half completed at the outset. What I should like to discuss with you is the place of the textile school in the new and expanded program of research in the textile industry that is certain to be thrown into high gear as soon as the war is over. More specifically, I want to describe the position, as we now see it, of the Textile School at N. C. State College in the scheme of things in research.

* Presented at Summer Meeting, Piedmont Section, June 17, 1944.

TRAINING MEN FOR RESEARCH

At the present time and in the past, the problem of obtaining personnel with adequate qualifications for textile research has been the most serious one in any program. With few exceptions the laboratories themselves have had to be the training schools for research workers. Young men and women well-grounded in chemistry, physics, or textile manufacturing must now spend long, unproductive periods in the work before they can become valuable assets to a research unit. I do not mean to say that this practical experience can be substantially replaced by any training that is now or will be available in the colleges and universities for many years to come. But with a teaching staff possessing not only an appreciation of research but also a background of experience in it, a textile school should be able to impart some invaluable training to the student who plans to take up research as his life's work.

Each textile school differs from the others in its objectives and its make-up as regards teaching staff and equipment. Upon those factors will depend the success with which these institutions can turn out students who are fitted to become productive in textile research after a minimum of experience following graduation.

I have referred to the possibilities of training young men and women as professional research workers. No doubt only a small proportion of the students studying textiles will possess the qualifications or even the desire to get into this field. It is difficult to imagine a person in any branch of the industry, however, to whom even a speaking acquaintance with textile research will not prove to be a valuable asset. The fruits of research will be a useless product indeed unless the men in production have an appreciation of its value, and an intense desire to apply it and profit thereby in their own organizations. Therefore, to the greatest possible extent, a school should endeavor to acquaint all of its students with the possibilities and limitations of the tools of textile research; with the most modern methods of analyzing and interpreting the results of research; and lastly, with the identity, scope and objectives of the different organizations conducting textile research.

STAFF AND FACILITIES OF STATE COLLEGE

Most of you know, I think, of the splendid assistance the Textile School at State College is receiving from the N. C. Textile Foundation, enabling us to appoint men of unusual experience to our staff. I should like to mention also the fine cooperation we have received from State officials and from the administration of the University and State College. Fortunately for us, we have found these men not only appreciative of the benefits of research, but actually insistent that each unit develop an active research program. At the same time, they are aware that for the proper conduct of research, expensive and up-to-date equipment is needed, and so we have received every encouragement to add to our laboratory facilities.

In order that you may have a basis for understanding the caliber of research instruction that our School may be able to impart (as well as the kind of research that we shall be able to pursue, which I shall discuss a little later) I should like to describe to you briefly the kind of men we now have on our staff, and mention at least some of the equipment available at the School. First, let us consider some of our staff members, since the success of such an enterprise will depend far more upon brain-power than upon laboratory apparatus.

The head of our Department of Textile Chemistry and Dyeing is a man who has had 30 years experience in teaching his subject, and, I believe, enjoys a reputation second to none in his field as a fine teacher and an excellent research man. He thinks in terms of today and tomorrow, instead of in the past, as is so frequently the case with men of such long experience. As Head of our Yarn Manufacturing Department we are fortunate in having a man who has had a fine engineering education, followed by many years of responsible experience both as a mill executive and as a research and developmental engineer. One of the key men in our Weaving

and Designing Department has had a considerable amount of experience in applied research in warp sizing and other phases of his field. The newly-appointed Head of the Knitting Division is a trained mechanical engineer who has conducted research in European plants, and who has a number of mechanical developments in knitting to his credit. A fifth member of our staff, whose duties involve cotton manufacturing research as well as the rendering of technical assistance to mills, has worked previously in a number of textile projects. Other members of the textile faculty have had some experience in research, as well as in the production phases of the technical subjects they are teaching.

As for facilities and equipment, the following partial list will serve merely to indicate the scope of research possible at the School: In the Textile Chemistry and Dyeing Department, besides large- and small-scale bleaching and dyeing equipment, there are an unusually fine collection of microscopes, photomicrographic equipment, fiber cross-sectioning devices, a Fade-O-meter, a Launder-O-meter, pH equipment, drying ovens, and other specialized research apparatus. For physical testing and research, there is now being installed a precision air-conditioning system in our laboratories. Recent acquisitions in apparatus include a Suter-Webb fiber sorter, a Fibrograph, a Pressley fiber strength tester, several torsion balances, a power-driven yarn reel, both pendulum-type and incline-plane yarn and fabric testers, a Moscrop automatic single-strand yarn tester, fabric abrasion testers, and air and water permeability testers for fabrics. Pilot laboratories are also available containing adequate machinery for spinning, weaving, knitting, and dyeing and finishing cotton, wool, and the various synthetic fibers under controlled conditions.

With all of this equipment and a staff of the caliber mentioned, therefore, we believe that the Textile School at State College is in an excellent position to give sound training in textile research methods to its students. For those interested in pursuing graduate studies in research, special curricula will be developed to meet individual requirements, and the School stands ready to step up the tempo of its research training in this regard as the demands for it increase.

What has just been said with regard to the Textile School at State College is also true in greater or less degree with other textile schools in the country. The direction and pitch of their research training will depend upon the objectives of each institution, upon the quality of its teaching staff, and upon its facilities. As the demands for trained graduates in the field increase, and this is sure to occur, the schools will of necessity readjust their sights to this important requirement.

CONDUCTING RESEARCH IN THE TEXTILE SCHOOL

So much for the training of students in research in the textile schools. And now the question: Should textile schools attempt seriously to carry on research programs themselves, and if so, of what general types? Again the answer will depend upon the peculiar set of circumstances existing in the individual institution, and in this connection, I shall confine my remarks to the Textile School at State College. Here, the answer is definitely yes. I say this in spite of the feeling that exists in some quarters that too many organizations already occupy the field, and that as a result, overlapping and duplication of effort are tending to stifle the possibilities that anything of real worth can result from additional effort. To anyone who has made a serious study of the question, it is obvious that there is no such thing as too much research, provided, of course, that those responsible for the various programs have the proper perspective and guard against a general muddle of the kind mentioned. Fortunately, such a possibility has already been effectively precluded by the organization of the Inter-Society Council for Textile Research. If the members of this Council each keep one foot on the ground, there need be no confusion; in fact, the various research organizations can and, I believe, will cooperate and prove mutually helpful to one another.

We shall conduct research primarily because we feel that we are equipped, mentally and physically, to contribute something useful to the industry through it, and I do not think this motive needs further expansion. A secondary motive, but one of importance to us, is that research keeps a teaching staff on its toes—protects them from the inevitable rut into which so many good teachers fall if they do not have something new to help maintain a proper balance.

TYPES OF TEXTILE RESEARCH

Just what constitutes research and what does not, is always a good subject for argument. The term "research" has come to be very loosely used, and may indicate anything from simple trouble-shooting to the labor required to produce, for example, the tome which I recently ran across entitled "A Revised Map of the Left Limb of the Third Chromosome of Drosophila Melanogaster," and which, incidentally, may well be considered the height of specialization! Dr. C. E. K. Mees, Vice-President and Director of Research of the Eastman Kodak Company, says that "Research can be considered as organized effort to learn how to do things you will need to do when you can no longer do the things you do now." It would appear that such a definition is appropriate for the textile industry, as from all indications a plant that expects to continue using old-fashioned methods is going to find itself pushed out of the picture early in the post-war years.

TWO GENERAL TYPES OF RESEARCH

Permitting a sufficiently broad interpretation of the terms, all research may be placed in one of two categories, fundamental and applied research. This group of chemists and dyers, I am sure, needs no further enlightenment on what constitutes one, and what constitutes the other. Giles E. Hopkins, Director of Applied Research for the Textile Research Institute, recently stated that "the concept of fundamental research . . . in general places the emphasis on the desire to determine basic principles which control the behavior of materials or energy in their various forms. . . . Applied research has the same relationship to fundamental research as engineering has to pure science. Essentially it is the step between the revelation of the principle as turned up by fundamental research and the application of this principle to answer known demands."

In many cases a good piece of applied research may be accomplished without a very complete knowledge of the fundamental principle involved. If we had had to wait, for example, until we knew all about the phenomena that would take place within a carding machine before we could apply the principles to cotton, the human race would still be tapping its collective foot, waiting for the card to be invented. The fact is, we do not know yet exactly how the fibers behave in a card, but some 80,000 of the machines are in operation in this country every day! In other words, there is still a place for the empirical, or "trial-and-error" approach to research, although the efficiency of this method may well be questioned in many cases.

Because of the experience and mental make-up of our staff, and in view of the facilities available to the State College Textile School, we can expect to contribute

more by confining our activities primarily to the field of applied research. There may be cases in which some work of a fundamental nature may be conducted, as for example the measurements of the physical characteristics of fibers under different degrees of relative humidity and temperature. But in general the greatest returns from research can be expected in a textile school if the program centers around the application of principles to commercial production, whether it be in bleaching, dyeing and finishing, or in the spinning and weaving or knitting of various materials.

There is one point that I should like to emphasize with respect to research of all kinds, and that is the time element involved. There are those in positions of authority in the textile industry who firmly believe that a month is ample to set up any research project and put it into action, and that, say, on every second Monday the project should produce a new, revolutionary and money-saving finding or it isn't worth the money spent on it. To those men I would call attention to Dr. Mees' statement, appearing in "Textile Research" for December, 1942, that "It will take a new laboratory five years to find its feet. . . . And it will require at least ten years before the research laboratory pays profits." The actual time required for either, of course, will be determined by many factors, but the point is that successful research cannot be conducted with one eye on the clock and the other on the calendar. The supporters of research must have faith in the staff and its objectives, and they must expect that many blind alleys will be traversed before anything of outstanding value can be accomplished.

ADDITIONAL ADVANTAGES FOR RESEARCH AT STATE COLLEGE

It is an elementary but frequently-overlooked fact that before embarking upon a research project it is well to spend a sufficient amount of time to survey the field and determine what has been done previously on the subject. To do this quickly and thoroughly requires adequate library facilities. At State College we expect very shortly to have an excellent textile library in our School under the supervision of a trained librarian, and of course we shall make full use of the library in our research.

We enjoy another advantage at State College which already has proven very valuable to the research we are doing. There are outstanding chemists, physicists, engineers, agricultural scientists, mathematicians and statisticians on the College faculty who are available at all times for consultation and cooperation, and assistance is begin given to us by these specialists whenever the need arises. In fact, the Administration is fostering the fullest cooperation among the different units particularly with reference to research, and the value of such cooperation cannot be over-emphasized.

In planning our research program we have high hopes of establishing a Department of Textile Research, with a staff of trained people working under the direction of an outstanding scientist. When this is done you may rest assured that no aspect of textile research will be overlooked and that equal emphasis will be given to the chemical, physical, and mechanical problems of the industry.

FINANCING RESEARCH AT A TEXTILE SCHOOL

Many relatively small research projects can be managed at a textile school without the need for any aditional funds whatever. It is our policy to carry out investigations of a limited scope for the mills of the State upon request and without charge. If the project requires considerable time and some new equipment and materials, it frequently is possible to undertake such an investigation for a reasonable fee, which merely covers the additional expenses. In some cases a research organization may sponsor a project at a school, the funds being obtained from its members. In other instances in which war requirements of the industry necessitate research, the Government may request and finance research in the schools. At State College, for example, we are currently conducting some research on cotton carding under the sponsorship and general technical guidance of the Textile Research Institute. In this case the work is being financed by the Government because it touches upon a vital production problem.

I hope that I have been able to give you some insight into the relationship of the textile schools to textile research in general, and to the program of research at the State College Textile School in particular. If we boil down and concentrate the stream of our discussion, we may say, first, that the schools can, at least in some cases, contribute to research laboratories and to the industry by giving students a background of knowledge of textile research; and second, that with suitable personnel and equipment at hand, the schools can contribute a great deal to the industry by conducting applied research in their own laboratories.

Determination of Mercury

(Concluded from Page P310)

REMARKS

The number of cc. of Dithizone Solution used for a titration of a sample should not exceed more than 100% of the number of the cc. used in the standardization of the Dithizone Solution. In case of material containing excessive amount of mildewproofing material, the size of the sample should be reduced to 0.200, 0.100 or even to 0.050 gm.

The above method is very consistent, accurate and requires no special equipment or apparatus. It employs no dangerous chemicals. It gives reliable results, even in the hands of inexperienced operators. It is very rapid, when ten or more samples are being analyzed, it does not require more than 10 minutes per sample. Thus it easily allows making duplicate or even triplicate determinations of the same sample, which greatly enhances the accuracy of the results. The necessity of the destruction of the organic matter, which is tedious, time consuming, and dangerous both to the operator and to the results of the determination, is totally obviated by this method. The use of ether saturated with HCl for forming and extracting the $HCl\text{-}HgCl_2$ complex excludes, on one hand, all other possible interfering metals; and, on the other hand, allows determinations of waterproofed material. Close to one-hundred separate determinations were made by the author, all giving excellently consistent results.

Having devised a practical, reliable method of mercuric determination on the fiber, we are at present working on an investigation of chemical properties of commercial organo-mercuric compounds on which a later report will be given.

MEETING DATES, RHODE ISLAND SECTION

THE Rhode Island Section is planning meetings on the following dates for the 1944-45 season: September 29, October 27, November 24, January 26, February 23, March 30.

Committee Chairmen for ANNUAL MEETING

Atlantic City, New Jersey, October 12, 13, 14, 1944
Auspices of Philadelphia Section

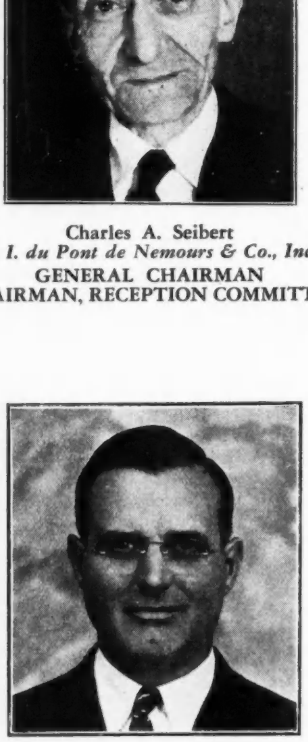
PLANS are well underway for the annual meeting to be held at Atlantic City, N. J., on October 12th, 13th and 14th, under the auspices of the Philadelphia Section. Emphasis this year will be placed on the technical program, the committee for which is under the chairmanship of Dr. Glen S. Hiers of Collins & Aikman Corp.

Charles A. Seibert of E. I. du Pont de Nemours & Co., Inc., is chairman of the general committee on arrangements and is also serving as chairman of the reception committee.

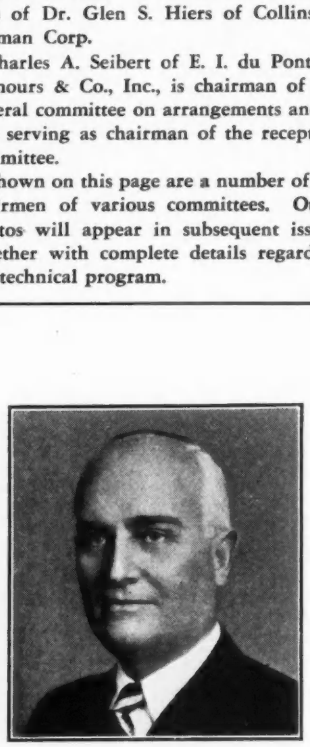
Shown on this page are a number of the chairmen of various committees. Other photos will appear in subsequent issues, together with complete details regarding the technical program.

Charles A. Seibert
E. I. du Pont de Nemours & Co., Inc.
GENERAL CHAIRMAN
CHAIRMAN, RECEPTION COMMITTEE

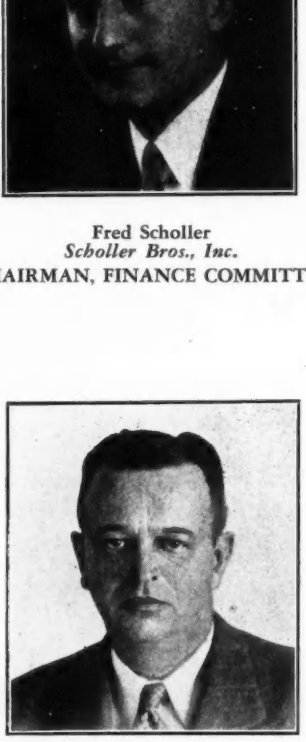
Fred Scholler
Scholler Bros., Inc.
CHAIRMAN, FINANCE COMMITTEE



James Dixon
Calco Chemical Division
American Cyanamid Co.
CHAIRMAN, LADIES COMMITTEE



DeHaven Butterworth
H. W. Butterworth & Sons
CHAIRMAN, BANQUET COMMITTEE



Walter G. Hamlen, Jr.
E. I. du Pont de Nemours & Co., Inc.
CHAIRMAN, PUBLICITY COMMITTEE

CALENDAR OF COMING EVENTS

Meeting, Southeastern Section, Callaway Institute, La Grange, Ga., September 9, 1944.

Annual Meeting, Hotel Claridge, Atlantic City, N. J., October 12, 13 and 14, 1944. Auspices of Philadelphia Section. Further details will appear in the near future.

Meeting, Rhode Island Section, September 29, 1944.

Note: Secretaries of local sections are requested to advise the AMERICAN DYESTUFF REPORTER of meeting dates for the 1944-45 season as soon as available.

The Dyeing of VISCOSE RAYON YARN in Cake Form[1]

C. M. WHITTAKER

(Concluded from July 3rd issue)

IN a previous paper*, the direct cotton dyes were divided from the point of view of package dyeing, into three classes, viz.—

Class "A" Dyes, which have a high rate of exhaustion without added common salt, but have a very low time of half-dyeing, so that they level quickly.

Class "B" Dyes, which have a low rate of exhaustion without added common salt, but the rate of exhaustion may be adequately controlled by carefully regulated additions of common salt beeed on their predetermined salt sensitivity.

Class "C" Dyes, which have a high rate of exhaustion without added salt and a time of half-dyeing which indicates that they cannot be expected to level quickly.

Class "A" dyes may be dismissed at once by saying that they present no difficulty in normal usage. In fact, the dry dye could be rubbed on the cakes, yet they would be dyed level. These dyes are largely used for lingerie shades.

Class "B" dyes present more difficulty than Class "A" dyes, since they must be applied uniformly because of their low rate of migration. Commonsense control of the salt addition enables them to be dyed without difficulty, but thereby lengthens the time of dyeing as compared with Class "A" dyes. With Class "B" dyes, if an addition of dye has to be made for shading purposes and the dye liquor has had salt added to it, then the dye liquor containing the salt must be run off and fresh dye liquor containing no salt must be used for topping up.

Class "C" dyes have high rates of exhaustion without added common salt, and times of half-dyeing which indicate that they must be applied in a level manner because of their poor rates of migration. This class of direct dyes is the most difficult to dye satisfactorily on cakes and requires (1) the highest concentration of dye commercially feasible, and (2) the adoption of temperature control.

Dyeing with Class "A" and Class "B" dyes are always commenced at 90° C., because the viscosity of water at 90° C. is low in comparison with its viscosity at low temperatures; the freest circulation is therefore obtained at high temperatures.

[1]Presented at meeting, Manchester Section, Society of Dyers and Colourists, October 15, 1943. Published in their Journal, May, 1944.

Viscosity of Water

Temperature (°C.)	Fluidity (reciprocal poises)	Temperature (°C.)	Fluidity (reciprocal poises)
20	90	60	213
30	124	70	246
40	152	80	280
50	182	90	315

Dyeings with Class "C" dyes, however, must be commenced at room temperatures, and the temperature raised slowly and regularly to 90° C. in the course of 1 hr. The following exhaustion figures for Benzopurpurine 4B Standard (S.) and Benzopurpurine 4B 180 (S.), both dyed in 10 vol. on 150/27 viscose rayon for 30 min. without addition of common salt, illustrate the necessity for this precaution.

Temperature (°C.)	Per Cent Exhaustion: Benzopurpurine 4B Standard (S.)	Per Cent Exhaustion: Benzopurpurine 4B 180 (S.)
30	40	16
40	66	25
50	83	40
60	88	52
70	89	64
80	91	75
90	94	81

The results tabulated above are illustrated by Fig. 1.

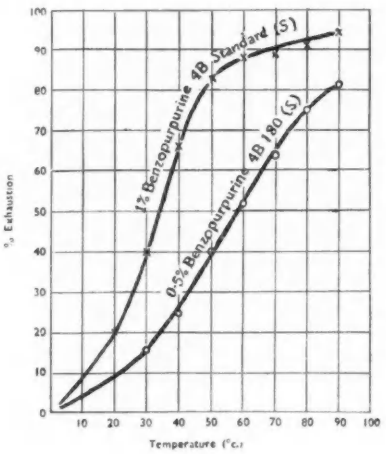


Fig. 1

It is only the Class "C" type of dye which it is necessary to have in the most concentrated form commercially feasible. When supplied in such a highly concentrated form, some Class "C" dyes, e.g. Chlorazol Blue B525 (I.C.I.), may be put into Class "B," because, as they have no affinity for the fiber without salt, their rates of exhaustion can be controlled perfectly by adding salt.

There is no necessity to purchase Class "A" and Class "B" dyes in the highest concentration, because the normal commercial brands are completely controllable provided that they are not used together with Class "C" types, in which case the electrolytes present in the Class "A" or Class "B" dye might have a detrimental effect on the exhaustion rate of the Class "C" dye.

The present author has recorded in a previous paper* how a mixture of 0.75 per cent Benzopurpurine 4B 180 (S.) and 1.4 per cent Chloramine Purple 10BC (S.) gave a great deal of trouble in package dyeing on account of the electrolytes present in the latter, which caused a 90 per cent exhaustion of the former at 40° C., a rate of exhaustion which rendered the dyeing uncontrollable.

The supply of batch-strength dyes may present commercial difficulties to the dye manufacturers, but these difficulties are easily overcome with the goodwill of the dyer. The present author, when buying these concentrated types, is prepared to accept (1) slight variations in strength from delivery to delivery, and (2) variations in the shade of successive deliveries. These variations are overcome by buying a large quantity at a time, so that any inconvenience due to the changeover from one delivery to another of different strength and shade is infrequent.

The control of salt additions has been stressed so much that it appears advisable to describe the method used at Droylsden for making salt additions at 10 min. intervals. The following table shows the usual rate at which salt is added to salt-sensitive dyes of Class "B" which do not level easily and, therefore, must be applied carefully. The various additions of salt are made at 10 min. intervals and the figures refer to a 100 lb. lot of material.

Number of Additions	Weight of Common Salt added (oz.): Light Shades	Dark Shades
3	1	2
3	2	4
3	3	6
3	4	8
	—	—
Total additions	30 oz.	60 oz.

The above procedure is a general guide, but alterations are made as required when a shade involves a mixture of dyes which is known to be specially salt-sensitive, or when there is a stage during the addition of salt at which the affinity increases suddenly, thus indicating a danger point requiring special precautions. The salt is weighed out ready in separate paper bags in the above weights, so that the man in charge has only to watch the time intervals.

The above figures are suggested merely as a guide, because individual dyes vary widely in their salt-sensitivity, as shown in Fig. 2.

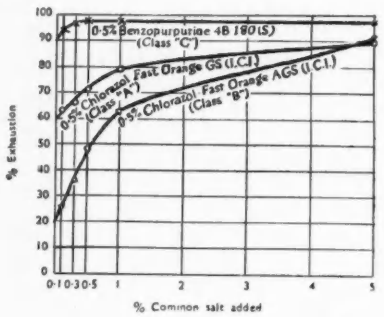

0·5% Benzopurpurine 4B 1801(S) (Class "C")
0·5% Chlorazol Fast Orange GS (I.C.I.) (Class "A")
0·5% Chlorazol Fast Orange AGS (I.C.I.) (Class "B")
% Exhaustion
% Common salt added

Fig. 2—Self Sensitivity Curves

150/27 Viscose rayon dyed at 90°C. for 30 min. in 10 vol.

The minimum figures tabulated above are those employed with the most salt-sensitive dyes, e.g. Chlorazol Fast Orange AG (I.C.I.), but Pyralon Orange G (L.B.H.), which has a much shorter time of half-dyeing, requires larger quantities of salt. Again, many dyes have a great salt-sensitivity up to a certain percentage of salt, but when this percentage has been passed, larger quantities may be added without risk of unsatisfactory results. Experience at Droylsden has shown that much less salt is needed in bulk dyeings than in matching shades in 10 vol. in the laboratory. Thus, the salt used in the bulk dyeings of 11 shades previously matched in the laboratory was only one-quarter of the amount of salt found necessary in the laboratory dyeings. This point should be borne in mind when dyeing a new shade in bulk for the first time.

SOLUBILIZED VAT DYES

This class of dyes may be dyed satisfactorily on viscose rayon in cake form within the limits of the depth of shade obtainable. The members of this class are just as varied in their individualism as those of other classes, and knowledge of their respective affinities and salt sensitivities is essential for success†.

The greatest difficulty experienced in bulk application has been due to occasional hydrolysis of the dyes during the prolonged time of dyeing, which is apt to give uneven results in the form of lighter-dyed threads. Soledon Jade Green XS (I.C.I.) is the most substantive member of this class and requires most care in dyeing. Soledon Blue RCS (I.C.I.) is one of the least substantive and, therefore, may be dyed at higher temperatures and with larger additions of salt.

The following two recipes, representing successful bulk dyeings, illustrate in detail the methods employed at Droylsden, all percentages being based on the weight of the material, unless otherwise stated—

(1) Dissolve 1.5 per cent Soledon Yellow GS 40 paste (I.C.I.), 0.44 per cent Soledon Jade Green XS 200 paste (I.C.I.), and 0.14 per cent Soledon Green GS paste (I.C.L.) in water at 60° C., pass the solution through fine cloth and add it to the cold dye liquor containing 1 per cent soda ash. Enter the cakes dry, circulate the dye liquor for 20 min. inside to outside and for 10 min. outside to inside, repeating this cycle throughout. After 30 min., raise the temperature slowly to 60° C. in 80 min., using a closed steam coil. Add common salt at 10-min. intervals as follows—3 additions of 0.5 per cent salt, 3 additions of 1 per cent salt, 3 additions of 1.5 per cent salt, and 3 additions of 2 per cent salt, making a total addition of 15 per cent salt.

A small sample of the material is developed and examined for shade before the last addition of salt is made, and the cakes are examined for penetration. If the shade is satisfactory, the cakes are developed for 1 hr. with 0.5 g. sodium nitrite, 1 c.c. sulfuric acid (B.O.V.), and 2 g. common salt per 100 c.c. dye liquor, and then examined to see if the shade is fully developed. If satisfactory, the cakes are washed off for 10 min. inside to outside, then for 10 min. outside to inside, first with cold water, then with cold 5 per cent soda ash; a warm wash is given next, followed by soaping at 80° C. for 20 min. inside to outside and then 10 min. outside to inside; finally, a wash is given with 1 lb. soap and 4 oz. Calgon per 100 gal. of dye liquor for 10 min. inside to outside.

(2) Dissolve 2.8 per cent Soledon Yellow GS paste (I.C.I.), 1.9 per cent Indigosol Brown IBR powder (I.G.), and 1 per cent soda ash in water. In this case, dyeing is commenced at 60° C. The dye liquor is circulated for 20 min. inside to outside and then for 10 min. outside to inside. Salt is next added at 10-min. intervals as follows—3 additions of 2.5 per cent salt, 3 additions of 5 per cent salt, 3 additions of 7.5 per cent salt, 3 additions of 10 per cent salt, and 3 additions of 15 per cent salt, making a total addition of 120 per cent salt. The shade is developed as described under Recipe (1). The affinity of these two dyes is much lower than that of the dyes used in Recipe (1), so more salt is required and it may be added in larger quantities at a time.

VAT DYES

Experience of applying this class of dyes to viscose cakes has been less extensive than in the case of direct cotton dyes. A large amount of experimental work has been carried out, however, as well as a limited number of bulk dyeings, and the main conclusion is that the temperature of the dye vat must be much higher than in normal dyeing practice, 90° C. being recommended. It is obvious that dyes of the Caledon Blue RC (I.C.I.) type must break down under these conditions, and the inability to dye this type of blue vat dye is the major problem at the moment. It must be solved because blue shades form such a large proportion of the vat-dyed shades in commercial demand; Soledon Blue RCS (I.C.I.) may be used only for pale shades. The economy in winding and the quality of vat-dyed yarn are most satisfactory after dyeing in cake form, and bulk shades have been dyed in which there has been less than 1 per cent winding waste.

AZOIC DYES

A limited number of azoic dyes have been dyed on viscose rayon in cake form without any unusual difficulties. The method of application is the same as that employed to obtain penetration of thick cloths i.e. the "naphthol" is applied at a high temperature. After padding with the "naphthol," the cakes are washed with a strong solution of common salt, in order to reduce the temperature previous to coupling, and, after coupling, they are finished off in soap in the usual manner, but using a filtration system, which is desirable in all pack machines when soaping off azoic-, vat- and sulfur-dyed shades.

SULFUR DYES

With the exception of Sulfur Black, this class of dyes has never been used at Droylsden to any considerable extent, for two reasons, viz. (1) the difficulty of matching exactly, due to gradual oxidation on storing; and (2) the fact that sulfur dyes show up strongly any variations in the dyeing affinity of viscose rayon. Considerable trouble has been experienced in obtaining satisfactory Sulfur Black shades on viscose rayon cakes, and it has been found necessary, in order to avoid light patches in the cakes, to employ temperature control by starting at room temperature and raising the temperature gradually to the boil. Sodium sulfide crystals should be used in machine dyeing.

PIGMENT PADDING

It is claimed that the pigment padding of vat dyes, which has been so largely

adopted in piece dyeing, is suitable for the dyeing of packages. This method has been used at Droylsden in many experiments with viscose rayon cakes, and no difficulty has been experienced in obtaining even impregnation of the cakes with dispersed vat dyes, which is an indication of the great improvement effected in recent years by dyestuff manufacturers in the production of highly dispersed vat dyes. A difficulty has always arisen, however, when applying the reduction bath, in order to reduce and fix the vat dye on the fiber; the surge of the reduction liquor through the cake has always washed the dispersed vat dyes off the fibers before it has had time to become fixed. In consequence, dyeing still has to be carried out in the usual manner with reduced vat dyes.

Finally, dyers are warned against the danger of drawing general conclusions from a particular lot of dyed material. It is so easy to blame the cake when, in fact, the blame lies elsewhere. The dyeing of viscose rayon cakes is still in an early stage of development and it is inadvisable, at present, to be too dogmatic about it.

REFERENCES

* Whittaker, Jour. Soc. Dyers & Col., 1942, 58, 253.
† Whittaker, ibid., 1938, 54, 259.

DISCUSSION

Fred Smith asked the Lecturer how he would account for a dye of the level dyeing Class "A" type giving an uneven dyeing.

The Lecturer explained that collapse of the cake might take place early in the dyeing and this could not be seen owing to the machine being a closed one. If it took place within the first 5 min., the cake would be locked or pulled on to the opposite side, and the liquor would pour through the collapsed side. The other side would be tightened, and it was the tight side which was not penetrated. Experience had proved that, in such cases, pumping could continue indefinitely without producing thorough penetration of the dye.

The example quoted was an exaggerated case. There would normally be channelling, due to the liquor surging up. If there was one cake which was somewhat weaker in the wall than any other cake on the same spindle, that cake would blow and one portion of it would lock and would not be penetrated. But if the faulty cake were taken out and hydroextracted the channelling would be stopped.

A. Williams, commenting on the Lecturer's statements that a laboratory machine would not give similar results to a 42-spindle machine, suggested, as the result of an experience he had had some years ago, that, if there was a similar volume of liquor in both cases, the laboratory machine would be as effective as the 42-spindle machine. He did not disagree with the Lecturer's statement that the amount of liquor in contact with the yarn was what mattered, but what he had stated was proved to be the case some years ago in cop dyeing. It was necessary to use a laboratory machine which would give exactly the same liquor-goods ratio, and the experimenter concerned had in that way achieved exactly the same results with the full machine with 100 lb. of cops.

The Lecturer replied by asking why the 5-spindle machine did not give the same results as the 42-spindle machine when the liquor-goods ratio was the same in both cases?

E. B. Adams referred to the winding of the cakes and said he assumed that the density throughout the cakes was quite even. He was thinking of trouble connected with the cone dyeing of cotton. Difficulties were experienced in winding the yarn on to the cones, and there was sometimes uneven tension. When the cone was wound, parts of it were softer than other parts, because the tension was not even while the cone was being wound. In the case of distorted cones it was found that white patches occurred where the tension had been higher. Were the Lecturer's cakes even throughout as far as tension was concerned?

The Lecturer assured Mr. Adams that every possible step was taken to ensure level-wound cakes. When it was realized, however, that every spinning box had its individual motor, it would be appreciated that every cake could not be expected to have a uniform density.

Mr. Adams said that an attempt was being made to produce 2½ lb. cones. One difficulty, when 250 cones were in the machine, was to ensure that the cones themselves were evenly tensioned throughout, if they were uneven, white patches occurred in subsequent dyeing.

The Lecturer remarked that there was a compensating device to reduce the tension as the cake was built up.

A. J. Hall asked what happened to the cakes between leaving the Topham box and being put on the dyeing machine?

The Lecturer said the processing was exactly the same as with skeins, except that cakes were desulfurized, etc., in a cake-washing machine.

F. Harris asked the Lecturer if he had experienced any difficulty with regard to migration of the dye during drying, e.g. with some of the level dyeing direct dyes?

The Lecturer replied that this difficulty had been experienced in regard to both skeins and cakes. If a shade gave trouble due to migration of dye, the dyeing was treated with salt solution before drying. He never used Chrysophenine G, although it was an excellent dye from the point of view of hiding defects in viscose rayon, because of the difficulty in that respect. Rigan Sky Blue G was a further example; at Droylsden the first dyeing was a complete failure because insufficient salt was used. The dye liquor drained to the bottom of the skein and continued to dye this part of the skein. The cure was simply to add more salt.

P. Caldwell asked whether experiments had been made in connection with the build-up of the cake with the idea of getting away from the parallel lay of the yarn; by altering the speed of the thread guider in the centrifugal box a more porous cake might be built up. He had not examined one of the cakes, and perhaps there was already sufficient crossover to give as porous a cake as possible. In winding beams, the Germans had always recommended the crossing over of the threads. He had recently found that in dyeing warps on beams wound by the chain method and not in single threads, when winding the warp directly on to the beam, the more it was crossed, the better the result. The Lecturer had referred to cotton and worsted dyeing. Had any research work been done on the relative resistance of these fibers to the flow of liquor in the dyeing machine? If a cotton machine was pumping, e.g. 2 gal. of liquor per lb. of cotton per min., at a pressure of 20 lb., did the Lecturer find that the pressure had to be greatly increased for viscose rayon cake dyeing?

The Lecturer said that, in the first place, there was a traverse in the cake. Much work had been done by his production colleagues in order to determine what they considered to be the ideal traverse, this being controlled by the movement of the funnel which delivered the thread into the Topham box. This "cross" was considered to be the best for the time being but work was always being done on it, and it might be altered later.

With regard to the pressure, his experience was that, in general, the lower the pressure in cake dyeing the better the result, provided that penetration was obtained. The pressure used varied from about 8-12 or from 10-14 lb. per sq. in. There was a difference of 4 lb. between the in-pressure and the back-pressure. He did not know whether there was any difference in the case of worsted.

C. Wilkinson said that there was no difference on worsted rolls; it went higher on cotton rolls.

The Lecturer said that he did not wish members to think he was seriously engaged in worsted dyeing; only a relatively small amount had been dyed.

Mr. Caldwell said he understood that, in the case of the Longclose machine, the full volume of liquor was constantly being circulated through the expansion

(Concluded on Page 321)

Study of the Effect of Acid on the BREAKING STRENGTH of Warp and Filling Threads in Sheeting

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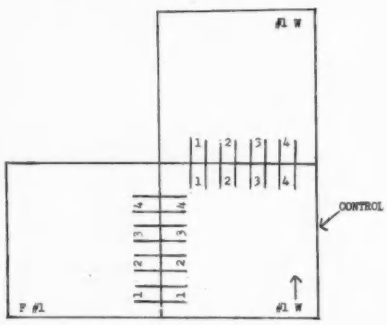
SINCE as far as is known no work has been done to determine the susceptibility of the warp and filling threads of sheeting to chemical degradation with acids, such a series of tests was conducted at Lewiston.

A piece of 64 square sheeting with 21.97s warps and 21.85s filling was taken after the peroxide bleach and double washed. This piece was then air dried flat so that there would be as near complete shrinkage as possible since it was necessary that subsequent operations in the wet would not change the fabric. At this point the cloth had a pH of 6.91.

The cloth was laid out flat and as many groups of three ten-inch squares were drawn on the cloth as the size of the piece permitted. These ten-inch squares were so placed that each group of three squares formed three-quarters of a twenty-inch square; thus one of the three squares had one ten-inch square attached to it warpwise and the other ten-inch square attached to it filling-wise, this central square to be known as the control square.



The groups of three squares were cut out and each square was numbered, warp threads were indicated by an arrow, and the two end squares were marked "warp" and "filling" respectively with indelible ink. Lines were drawn with the aid of a pick glass so that one thread was followed between the end squares and the control square. These were numbered so that they could be matched up after the squares had been cut apart. The squares were cut apart and the end squares were matched together as follows; #1 warp and #1 filling, #2 warp and #2 filling, #3 warp and #3 filling, etc.

Acid solutions were made up in concentrations starting with 0.01% C.P. Sulfuric acid by volume and increasing by 0.03%. The sets of the end squares were immersed in these solutions and squeezed through a wringer starting with #1 in the 0.01% acid, #2 in the 0.04% acid, #3 in the 0.07% acid, etc. After the acid treatment and the squeeze the squares were laid flat on strings to air dry.

Through the cooperation of William Watson, single thread breaking strengths were made at the Maine Mills Laboratory. All the squares, both acid treated and control, were conditioned at 65% humidity and 70°F. By means of a pick glass single threads were removed from the control square and every effort was made to remove the same threads from the acid treated pieces. Breaking strengths

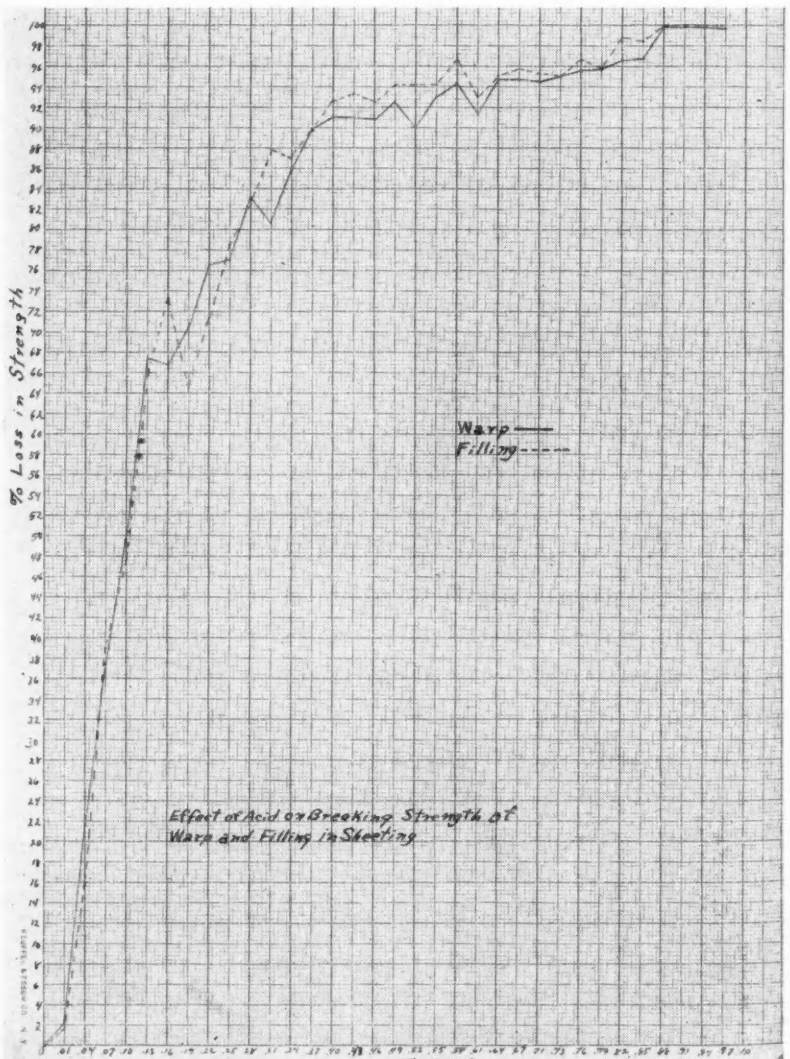


TABLE OF BREAKS

Sample No.	% Acid	Warp Control	Warp Acid Treated	Warp Loss in Strength	Filling Control	Filling Acid Treated	Filling Loss in Strength
1	0.01	427	417.8	2.15%	421.8	413.9	1.87%
2	0.04	431.5	337.7	21.72%	429.3	360.6	16.00%
3	0.07	435.5	272.2	37.50%	428.9	260.9	39.17%
4	0.10	377.8	188.6	50.08%	422.5	224	46.98%
5	0.13	438.2	141.8	67.64%	417.3	140.8	66.26%
6	0.16	416	138.5	66.71%	401.3	106.6	73.44%
7	0.19	387.3	389.1	70.41%	389.1	137	64.53%
8	0.22	361.4	85.4	76.37%	377.7	107.4	71.56%
9	0.25	364.1	83.3	77.12%	373.6	80.4	78.48%
10	0.28	397	66.5	83.25%	405.8	68.8	83.05%
11	0.31	384.1	74.6	80.58%	412.9	50.2	87.84%
12	0.34	357.6	50.1	85.99%	363.6	46.7	87.16%
13	0.37	393.3	39.4	89.98%	405.5	45	88.90%
14	0.40	378.6	33.9	91.05%	415.4	31.4	92.44%
15	0.43	350.2	31.4	91.03%	400.4	25.8	93.31%
16	0.46	424.2	38.6	90.90%	444.8	33.6	92.45%
17	0.49	397.5	30.2	92.40%	443.8	26.3	94.07%
18	0.52	409.1	41.4	89.88%	410.4	23.9	94.18%
19	0.55	394.2	28.2	92.85%	430.9	25.6	94.06%
20	0.58	391.9	22.6	94.23%	398.8	14.3	96.41%
21	0.61	380.2	32.3	91.50%	404.8	27.6	93.18%
22	0.64	381.6	20	94.76%	425	21.2	95.01%
23	0.67	368.6	19.8	94.63%	348.7	14.6	95.81%
24	0.70	366	20.8	94.32%	398	18.5	95.35%
25	0.73	441.3	22.8	94.83%	362.4	19.2	94.70%
26	0.76	401.1	18.0	95.51%	351.2	12.2	96.53%
27	0.79	378.9	15.8	95.83%	379.3	15.6	95.89%
28	0.82	374.4	13.4	96.42%	339.5	4.3	98.73%
29	0.85	379.7	13.3	96.50%	338.8	5.6	98.35%
30	0.88	370.6	0.64	99.83%	353.2	0.28	99.92%
31	0.91	378.4	0.70	99.82%	355.6	0.29	99.92%
32	0.95	353	0.51	99.86%	372.1	0.30	99.92%
33	0.97	325.5	0.60	99.82%	372.6	0.35	99.91%
34	1.00	....	....	....	....	....	....

were made on these threads using an "Incline Plane Serigraph" Model I-P-2 made by the Henry L. Scott Co. Fifteen breaks were made on both warp and filling threads for each set of tests. The average of the results of these tests are given in the table. Thus in this study 1980 individual threads were segregated and were broken.

The averages of the results showing percentage of tendering were plotted on a graph. This showed that while on the whole the curve of both warp and filling threads followed closely, there were sharper variations in the filling yarns studied.

Conclusion: This study would indicate that C. P. Sulfuric acid in strengths between 0.1% and 1.0% had approximately the same tendering action on both warp and filling threads in the same piece of cloth.

Viscose Rayon Yarn—

(Concluded from Page 319)

chamber. On certain types of continental dyeing machines, e.g. the Obermaier cheese-dyeing machine, circulation only took place through the dyeing machine proper. Was this change made because better results were achieved? It was not usually considered necessary to circulate the full volume of liquor through the expansion chamber. Was there any advantage in respect of level dyeing?

The Lecturer said that he did not think he could answer the question adequately. Although the Obermaier machine was used at Droylsden, it was not used for viscose rayon cakes. As he had previously stated, one idea was borrowed from one type of machine and another idea from something else, starting with the Franklin machine, which had an expansion tank. The expansion tank had been proved to be extraordinarily efficient for salting-on purposes. The objection to the Franklin type of machine was that the bottom of it was perfectly rigid, thus necessitating a separate screwing-in of each spindle with each loading, and a corresponding unscrewing operation when unloading. It was surprising to find such a cumbersome operation associated with an American machine. Fiber warps and skeins were dyed at Droylsden in an Obermaier machine, but it was an open machine with one-way circulation.

Dr. G. Ullmann confirmed that, on the Continent, the use of an expansion tank had proved satisfactory for such purposes as indicated by the Lecturer.

Wool Fineness—

(Continued from Page 308)

which the measurement is to be made can be clearly defined. It thus happens, particularly with inexperienced or tired operators, or when speed is essential, that the two points at which the inclined lines enter the image do not lie on a normal section, and a mark placed at either point gives an erroneous measurement (Fig. 1(c)).

Finally, the two points of intersection must be reached simultaneously. The entire wedge must be shifted until repeated trials locate the one proper position. Independent motion of the lines of the wedge analogous to the operation of a caliper, is not possible with this ruler, although the advantages of such independent motion are obvious.

A measuring device which retains the advantages of a wedge ruler and overcomes the difficulties discussed above is illustrated in Fig. 3. Essentially it consists of a calibrated spiral of Archimedes on a transparent rotary circular plate mounted on a baseboard. The latter serves as a screen for the image and is provided with four radial index lines with base lines normal thereto. Radii divide the curve into serially numbered sectors of uniform angular opening. Since the distance along an index line between a base line and the curve depends on the angular displacement, each sector is a "cell" covering a fixed range of lengths.

Fig. 4 illustrates the method of measurement with this device. The fiber image is projected through the transparent scale on to the base. The device is moved so that a base line is tangent to one side of the superposed image at the desired point as defined by the index line. The scale is then rotated until the curve meets the intersection of the opposite side of the image with the index line. A mark is placed with a soft crayon on the transparent scale in the cell over the index line. The process is repeated on other images until the required number of fibers has been measured. The number of marks in each cell is counted and the necessary calculations made as illustrated in Table I. The crayon marks are easily removed by light rubbing with a soft cloth.

The measuring operation above described is simple and rapid. Especially helpful are the independent movement of the curve to the point of tangency and the clear definition of this point by means of the index line. The certainty, speed and precision with which exact tangency is achieved with this device are markedly superior to those attainable by use of the wedge ruler.

Comparative tests in this laboratory

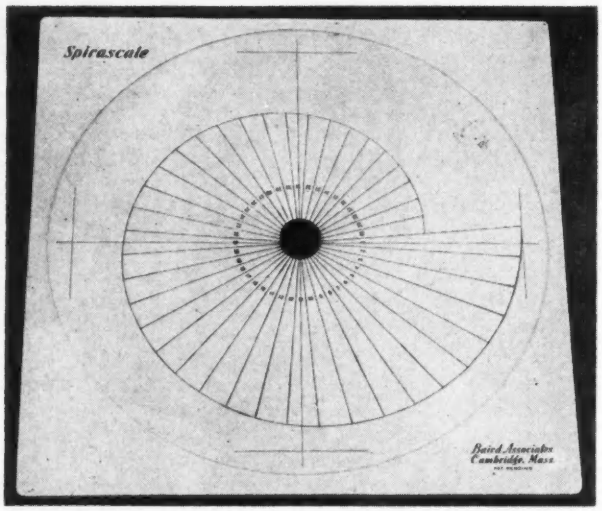


Fig. 3

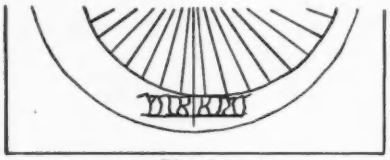


Fig. 4

have shown that individuals without previous experience in wool fineness tests can, with the new device, easily outstrip experienced operators measuring with the wedge and at the same time obtain more precise averages.

The range of widths that can be measured with the device, and the number of microns per cell, depend upon the degree of magnification of the image and the construction of the curve. For wool fineness measurements the following specifications have been found satisfactory:

Center to inner end of curve	— 50 mm.
Center to outer end of curve	— 90 mm.
No. of cells	— 40
Base	—210 mm. square

Magnification	*Microns per cell*	*Total range, microns*
500	2.0	0- 80
400	2.5	0-100
333	3.0	0-120
250	4.0	0-160
200	5.0	0-200

SUMMARY

In the standard method of determination of grade of wool by width measurements on projected enlarged images of the fibers, only one fiber can be measured with a single setting of the focus and stage. By the use of short fiber lengths slides can be prepared whereby this difficulty is overcome, leading to more rapid determinations.

A new measuring device is described which is superior to the wedge ruler and other scales in the speed and precision with which measurements can be made.

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TRADE NOTES • NEW PRODUCTS

• W.P.B. JUNE REPORT ON CHEMICALS

The Chemicals Bureau's June report on the distribution of chemicals for civilian use reveals continuing military pressure in a number of chemical fields, the War Production Board reported recently.

Naphthenic acid, sodium cyanide, chrome pigments, toluene and benzene are in especially short supply as a result of the requirements of the military, Chemicals Bureau officials said.

Other chemicals shortages were attributed by officials to a number of causes. All civilian requests for allyl alcohol were denied, and pharmaceutical requests for allyl chloride were denied to the extent of 50 per cent as the result of an accident in the plant of an allyl chloride producer, which halted production for 14 days.

A shortage of quinoline, a raw material obtained from coal tar, is responsible for the reduced supplies of another vitamin, nicotinic acid, Chemicals Bureau officials said.

A tight situation in isopropyl alcohol was reported, as a result of Summer allocations for anti-freeze manufacture, while the allocation of sodium nitrate for agricultural use was reduced because of the interruption of shipping from South America.

The increased military demands for naphthenic acid resulted in a substantial denial of civilian uses in June, while the sodium cyanide situation, attributed to a shortage of sodium metal, which is being taken for tetraethyl lead, was said to be such that the available supply is less than military requirements. One of the very few permitted civilian uses of sodium cyanide is for the production of fly spray.

The chrome pigments supply and requirement situation also was said by officials to be worse, although the prior month's allocation policy was continued into June because of the existence of a slight reserve. Smaller allocations may be ahead, officials said, but a turn for the better is expected in the Fall.

A general easing in the demand for solvents was reported, but this was attributed to the tight situation on phthalic anhydride, which has limited one of their principal uses. Because of the reduction in protective coatings, allocations of normal butyl alcohol to brake fluids were made for the month and some producers were reported to be operating at lower levels because of the slack demand.

A lowered demand for acetone also was reported, resulting in an easier allocation situation, which, officials said, may not continue because of expected new war requirements. Acetone goes into penicillin, rayon and plastics. The normal butyl acetate supply also was considerably eased because of the freer supply of solvents resulting in part from the phthalic anhydride shortage. As a result, there were substantially increased supplies available for civilian use in nitrocellulose lacquers.

A generally easier situation in diacetone was attributed to a reduced military demand for can coatings, making the chemical available to almost all users. It is employed for protective coatings, photographic work and cements.

Increased grants of methyl ethyl ketone to civilians also were made for June, but Chemicals Bureau officials said that this was a spot condition due to a temporary

reduction in coated fabric requests.

A cut in the amount of aniline allowed for fur dyeing was attributed to a greater usage by more essential industry.

In the plastics field, relatively more vinyl resins containing less than 92 per cent of vinyl chloride were reported available, permitting a larger allocation for combs. The increased supply reflects increased production through more efficient operation of existing plants.

• I.R.I. ELECTION

Dr. Charles S. Venable, Director of Chemical Research for the American Viscose Corporation at Marcus Hook, Pa., was elected to the executive committee of the Industrial Research Institute at its sixth annual meeting held recently at Pittsburgh.

• MEETING, S.O.C.M.A.

The regular monthly luncheon meeting of the Synthetic Organic Chemical Manufacturers Association was held at the Midston House, New York City, on Friday, June 16th, 1944. The next regular meeting will be held on Friday, September 8th.

• WARTIME USES FOR THE TRITONS

Triton NE and Triton N-100, designed primarily for use in the textile trade as powerful wetting agents and detergents, are now finding vital wartime uses as industrial cleaners, in priming compounds, electro-plating and pickling baths, in the manufacture of rubber life rafts and mine trap covers. Developed by the Rohm & Haas Company of Philadelphia, the unique chemical and physical properties of these Tritons makes them compatible with almost any type material. The NE emulsifies oils and hydrocarbons, while N-100 is also soluble in most organic compounds excepting aliphatic hydrocarbons.

These two materials are the same base product. Triton NE is sold in aqueous solution containing 30 per cent solids and N-100 is a concentrated material, 100 per cent solids, containing less than 0.5 per cent water. NE is an amber, viscous liquid while N-100 is darker in color and much more viscous. Both have a specific gravity approximately that of water and are an aryl alkyl polyether alcohol, soluble in all proportions in cold water but only slightly soluble in hot water. They are miscible with alcohol in all proportions and readily soluble in 50 per cent glycerine.

NE is essentially non-ionic and is compatible with a variety of materials over a wide pH range. It is compatible in concentrations of 2-5 per cent with such miscellaneous salts as 70 per cent $ZnCl_2$ and hard water salts such as $CaCl_2$ (5 per cent); with such acids as 37 per cent HNO_3 and 35 per cent HCL; with such bases as NH_4OH (80 per cent) and NaOH (5 per cent); and with such alkaline scouring salts as Na_3PO_4 (to 7 per cent) and Borax (to saturation), as well as many oxidizing and reducing agents. For practical purposes it is considered a non-conductor of electricity. However, 1 per cent solutions of the regular material will exhibit a conductivity of 4.0 milliamps at 90V, which is due to the presence of slight amounts of impurity.

Triton NE is reported to be extremely economical to use because of its high wetting and scouring activity in low concen trations. It is recommended in places where wetting agents have been previously used with limited success. It is recognized that no one wetting agent will solve all problems, but with Triton NE, it is claimed that an entirely new type of compound is available which works alone or enhance the activity of any other type of anion active or cation active dispensant.

• NATIONAL CARBON PRODUCTS TO BE HANDLED NATIONALLY

A new sales set-up under which all company products will be handled nationally from seven divisional offices is being installed by National Carbon Company, Inc., it is announced. Four of the new offices are in operation and the others will be added by October 1.

All sales activities in the Southeast have been consolidated under a new Atlanta Division office. This division will comprise, in addition to Georgia, the states of Virginia, North and South Carolina, Alabama, most of Tennessee, and Florida. J. F. Warnell, former manager under the "district" system and recently stationed at New York, has returned to Atlanta as division manager. The Assistant Manager is C. J. Chapman, who has been in company sales for the last ten years, and W. R. Peppard is Office Supervisor. The organization is using the former district address—41 Marietta Street, Atlanta 3.

C. C. Joslyn is manager of the new Dallas, Texas, division. He has been with the company more than a decade. Assistant manager is J. L. Mullen, recently district manager at Atlanta, and J. F. Uhl is office supervisor. The former district offices at 200 South Ervay Street, Zone 1, have been retained. This division will comprise, in addition to Texas, the states of Arkansas, Oklahoma, New Mexico, Mississippi, Louisiana, and part of Tennessee.

At Kansas City, A. C. Bryan has taken over as Division Manager. He has been with the company for ten years as salesman and sales executive. E. L. Dibble, former manager of the district there is Assistant Manager. C. H. Wade is supervisor of the new offices, which occupy the same location, 19th and Campbell Streets, Kansas City 8. The division will comprise, in addition to Missouri, the states of Kansas, South Dakota, Wyoming, Nebraska, Colorado, Western Illinois, and most of Iowa. Orders from electrode and anode customers in the Kansas City division will be received at the Dallas office.

On the West Coast, R. P. Tolles, manager of the former Pacific Coast division, succeeds to the direction of the new San Francisco organization. The assistant managers are A. R. Miller, former district manager at Portland, Oregon, and O. B. Rendahl. The new division staff will occupy the old address at 114 Sansome Street, San Francisco 4, and from this headquarters will be directed sales in California, Washington, Oregon, Western Montana, Idaho, Utah, Arizona and Nevada.

The three division offices yet to be opened will be located at Chicago, Pittsburgh and New York. Much enlarged staffs will be active in all the divisional headquarters, with the personnel made up of specialists and salesmen of long experience in all National Carbon lines. While the new system gives the divisional heads responsibility for sales of all company products, customers for carbon products, electrodes and anodes, will be served by men who give their whole time to those lines.

• TEXTILE RESEARCH INSTITUTE APPOINTMENT

Luther H. Hodges, Vice-President of Marshall Field & Co., Inc., and General Manager of its Manufacturing Division, has been elected a member of the Board of Directors of the Textile Research Institute, Inc., succeeding J. Spencer Love, who submitted his resignation when he became Director of the Textile, Clothing and Leather Division of the War Production Board.

Mr. Hodges has also been elected a member of the Executive Committee of the Institute, in line with a recent decision to expand that committee by the addition of not more than three new members.

• MATHIESON APPOINTMENTS

H. P. Smith, formerly president of the George Chemical Company, and Thomas Tarpy Schulten, formerly with the General Chemical Company, have been appointed field representatives of the New York office of the Mathieson Alkali Works.

Mr. Smith has had wide experience in handling and distributing alkalies and other chemicals and is well known to users of these materials in the New York metropolitan area. He is a graduate of Columbia University.

Mr. Schulten is an alumnus of St. Mary's College, Kansas, and the University of Virgina, and pursued special studies at

the Brooklyn Polytechnic Institute. He was with the General Chemical Company for eight years.

● NAVY PROMOTION

DeWitt Thompson, formerly assistant general manager of sales for the Mathieson Alkali Works and a past president of the Salesmen's Association of the American Chemical Industry, has been promoted to Lieut. Commander in the U. S. Naval Reserve. He joined the Navy in 1942, on leave of absence from Mathieson, with the rank of Lieutenant (s.g.) U.S.N.R., and is now in service at the Naval Air Station, Terminal Island, California.

● GENERAL ANILINE REPORT

How two German-discovered war materials were made available for use against the Germans in the United Nations invasion of Europe through the efforts of research workers for General Aniline & Film Corporation, a seized alien property now completely Americanized, is told in a report to James E. Markham, Alien Property Custodian, and his predecessor, Leo T. Crowley.

Production of the two products—Polectron resins and carboyl iron powder, both of which are important in the manufacture of radio and other electronic equipment—has been but one of many war accomplishments in behalf of the United States by the former German-dominated company, the plants of which have won three Army-Navy "E" awards for outstanding war production, according to the report which is made by General Aniline & Film Corporation's board of directors through its president, George W. Burpee.

"The directors and management of General Aniline & Film Corporation owe loyalty and allegiance only to the United States Government as represented by the Alien Property Custodian," Mr. Burpee commented in releasing the report. "No one individual will be able to get control of the company's stock when it is put up for public sale to private American investors."

In the report, Mr. Burpee asserts that, "the company has been thoroughly Americanized. All connections with I. G. Farben (the former parent German company) through members of the management has been terminated through the installation of the new management. The company's capacities have been utilized to the fullest extent in promoting the war effort with results which, evidenced by the three Army-Navy 'E' awards are outstanding.

"Plans have been made and the groundwork laid to enable the company to be an important organization free from foreign reliance and domination in the development of the competitive American chemical industry in the postwar era."

Government ownership has not resulted in any competitive advantage to the company, Mr. Burpee declares in the report. "In their efforts to expand the company's export business," he says, "the directors have adopted the policy of not taking advantage in any way of the present Government ownership.

"In particular the company has not had access to any information not equally available to its privately owned competitors. It has not requested the right to see, and none of its employees has seen, any part of the correspondence of any other person or corporation. In short, in regard to export as well as domestic business the company operates, and is treated by Government agencies, in exactly the same way as privately owned companies."

The General Aniline Works division is one of the principal producers of military dyestuffs in the United States. The division increased its production of military dyestuffs to 30 per cent above the rated capacity of its plant in December, 1942, and to in excess of 128 per cent above rated capacity in August, 1943, to meet the demands of the military forces, the report states. At all times the company has been able to supply the full demands of the armed forces, it is claimed.

To break completely the company's dependence upon the former German management for its research and technical "know-how," a central research laboratory has been established in Easton, Pa. Mr. Burpee declares that Americans of outstanding research ability have joined the organization and have concentrated on developing those of the company's patents having the greatest possibilities for use in the war effort.

"The Alien Property Custodian holds 98 per cent of the voting stock of the company," Mr. Burpee declares. "He has entrusted its management to the directors who have sought in every way to manage its affairs in accordance with sound American business methods.

"In this connection they have particularly kept in mind the Custodian's policy, with which they are whole-heartedly in accord, that the company shall never be allowed to return to German ownership but shall, on the contrary, be sold to private American investors. The directors have, therefore, in addition to running the company, proceeded to take the steps necessary to put it in proper condition for eventual public sale."

● JOINS FRANKLIN PROCESS

R. W. Joerger, who was previously with the Hope Webbing Co., is now with the Franklin Process Co., 564 Eddy Street, Providence, R. I. Mr. Joerger is secretary of the Rhode Island Section of the American Association of Textile Chemists and Colorists.

● APPOINTED RESEARCH MANAGER

Appointment of Dr. William W. Watkins as research manager to head the organic chemistry activities in the Pioneering Research Laboratory of the Du Pont Rayon Department, at Buffalo, N. Y., has been announced.

Dr. Watkins, who has been a research supervisor, joined the Pioneering Research staff in 1936 following graduate study at Harvard University, whede he obtained his Ph.D. degree in chemistry. He is a native of Cleveland, Ohio, and a graduate of Ohio Wesleyan.

The Pioneering Research section, of which Dr. W. Hale Charch is director, devotes itself to scouting work in research and process development in the field of synthetic fibers and films. It is part of the Technical Division of the Rayon Department.

● PIGMENT DEPT., CALCO CHEMICAL

The formation of the Pigment Department, Calco Chemical Division, American Cyanamid Company, became effective July 1.

The new department handles all products formerly sold by Calco and United Color and Pigment Department to the pigment-consuming industries. Included are Unitane (titanium dioxide) and other products of the Virginia Chemical Corporation, whose manufacturing facilities have just been acquired by Calco.

The Pigment Department is under the management of John Allegaert, with Leo Sklarz as manager of sales. Dr. R. A. Shive has been appointed director of technical services of the department.

Further changes in the sales organization are as follows:

Sam Klein, who was recently appointed Western sales manager for Calco, will also handle sales for the Pigment Department in that territory.

Frank Reinhardt will represent the department in the Philadelphia territory.

● TARIFF PROTECTION

Full employment after the war, now generally considered to mean 50 million jobs, can only be attained if American workers and industries have adequate tariff protection, Dr. Elvin H. Killheffer, executive committee chairman, American Tariff League, told the Economic Leadership Conference meeting in New York on June 16th.

There is real danger, he declared, in the present trend toward "freedom of trade among nations despite differences in wage and living standards" among various competing countries. Already tariffs have been reduced below the point where many industries can continue after the war. Continued industrialization of low-

wage countries, he warned, makes the threat even more real. He said:

"Industrialization of many low-wage countries has been only temporarily interrupted by the war. Indeed, some countries have continued and even expanded their industrialization during war—with equipment supplied by the United States and United Kingdom.

"Unless we take a very short view, we must not forget that while there will be delay in rebuilding the destroyed industries of occupied nations, the United States and United Kingdom will be helping rebuild them and the new plants will be the most modern obtainable, with equipment and much 'know how' furnished by the suppliers."

Sponsored by the American Tariff League, the conference brought together some 400 leaders of industry, agriculture and labor for an exchange of views of post-war national and international trade policies.

Dr. Killheffer cited recent public statements that American industry should switch to lines of manufacture not dependent on the aid of tariffs.

"Full employment of our people," he declared, "cannot be provided in a few lines of production where no tariff protection is needed."

"Even if the jobs could be supplied for everyone now in protected industries," he went on, "it still would not be advisable for reasons of national security."

"Had we followed that advice before this war, how could we have become the arsenal of the world?" he asked. "The very multiplicity of productive lines is what made that possible."

There is a lively propaganda campaign going on here and abroad, he indicated, calculated to obtain further reductions in United States tariffs. Chief cry is that our tariffs are too high.

As a matter of fact, he declared, United States' tariffs are among the lowest of the great trading nations. The United Kingdom, Germany, Switzerland, Italy, Spain, Turkey, Greece, Hungary, Mexico, Egypt, Brazil and Argentina, he added, all have higher tariffs than this country and all pay lower wages.

Charges that America is isolationist in its foreign trade were vigorously denied by the speaker. More than two-thirds of our imports come in duty-free, he asserted, and some 1,200 reductions have been made in tariff schedules in the past 10 years under the Reciprocal Trade Agreements Act.

"Europe does a little more than one-half the foreign trade of the world," he continued, "yet in 1937, there was only seven cents per capita difference between Europe's foreign trade and that of the United States. Europe, $28.94 per capita; United States, $28.87.

"Certainly this does not support the charge that we followed an isolationist economic policy."

The cooperation which the United States can safely contribute in international economic affairs, Dr. Killheffer concluded, will depend on the maintenance of a sound and prosperous internal economy.

● "PROTON PROCESS"

The Alrose Chemical Co., Providence, R. I., announces the "Proton Process" for imparting non-shrinking and non-felting qualities to wool and woolen fabrics. The "Proton Process" is said to be equally applicable to wool stock, yarn, and finished woolens of woven or knitted fabrication. Mixtures of wool and cotton may also be "Protonized" without detrimental effect to the cotton.

The "Proton Process" utilizes an aqueous solution at a pH of 2 to 3. The entire treatment is completed at room temperature in about one hour and requires no special equipment.

It is claimed that woolens when treated with the "Proton Process" and felted for one hour show less than 1 per cent shrinkage. It is stated that the "Protonized" woolen is soft and lofty and whiter than the original wool. The tensile strength is not diminished and the abrasion resistance, based on a Tabor Abrasor rating, is said to be increased 80 to 100 per cent.

The "Proton Process" should be of especial interest to woolen hosiery manufacturers, woolen underwear manufacturers, woolen yarn manufacturers, sweater manufacturers, and all processors and knitters of woolen fabrics.

A patent is pending on the process.

● NEOPRENE PROCESS FOR RUSSIA

As the result of negotiations undertaken at the request of the United States Government, E. I. du Pont de Nemours & Co. is making its neoprene synthetic rubber process available to the Soviet Union, the company announced recently.

Full technical details necessary for building and operating plants to produce neoprene, the first successful general-purpose synthetic rubber ever developed, are being sold to the People's Commissariat of the Rubber Industry of the U. S. S. R. under an agreement dated June 22, 1944.

The Du Pont Company's policy is to grant to the United States Government free rights under its patents and processes for military purposes during the period of the war, and as this process is made available through negotiations undertaken at the request of the United States Government no compensation is being asked of the Soviet Union for the production of neoprene while Russia is at war with Germany. The amount of compensation in the post-war period will depend upon the volume of Russian production of neoprene.

● COMPLETION OF ORGANIZATION

A constructive step toward the coordination of textile research activities, and the avoidance of unnecessary duplication, has been taken through the completion of the organization of the Inter-Society Council for Textile Research. It has been announced that the voting representatives of the members of that Council have elected Giles E. Hopkins, director of applied research of the Textile Research Institute, Inc., chairman, with the following appointed members of the executive committee: John T. Wigington, director of the Division of Technical Service of the Cotton-Textile Institute; Simon Williams, director of research for the National Cotton Council of America; Wm. D. Appel, chief of the Textile Section of the National Bureau of Standards, and R. W. Vose, secretary of the Industrial Fiber Society.

Recognition of the need for just such an organization led to a meeting of representatives of the major textile research groups last fall, at which plans for the formation of the Council were laid. A steering committee was appointed and has now completed the organization.

It is planned that the Council will provide facilities for the maintenance of a continuous inventory of active research work sponsored by textile groups working in the interests of the industry. Through the use of this inventory, the individual organizations will be in a position to avoid unintentional duplication of studies already in progress. It is felt that this service should go a long way toward increasing the effectiveness of research for the textile industry.

The organizations now cooperating in the Council are: American Association of Textile Chemists & Colorists; American Association of Textile Technologists; American Society for Testing Materials; Cotton-Textile Institute, Inc.; Industrial Fiber Society; Institute of Textile Technologists; National Bureau of Standards; National Cotton Council of America; Southern Regional Laboratory (Dept. of Agriculture); Textile Foundation; Textile Research Institute, Inc.; War Food Administration (Dept. of Agriculture).

● BOOKLET DESCRIBES AMINES

Carbide and Carbon Chemicals Corporation, a Unit of Union Carbide and Carbon Corporation, has just published a new booklet on "Amines," which condenses important information on 25 members of this particular group of organic chemicals

that are available in commercial quantities.

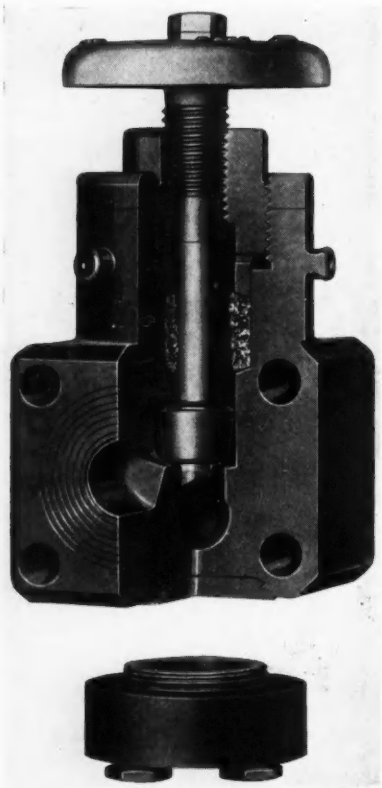
The first part of the booklet contains the names, formulas, physical and chemical properties, specifications, container and shipping data, applications, and uses of each chemical of the family. The remaining portion of the book contains valuable information in the form of special graphical data. The graphs include such data as the freezing points, viscosities, boiling points, surface tensions versus composition of aqueous solutions; neutralization, vapor pressure, and hygroscopicity curves, along with other pertinent information.

The "Amines" booklet will be of interest to those using or manufacturing emulsifiers for polishes, cosmetics, insecticides, and cutting oils; dyes; detergents; textile softeners; photographic compounds; rubber products; and pharmaceuticals. Copies of the booklet can be obtained by writing Carbide and Carbon Chemicals Corporation, 30 East 42nd Street, New York 17, N.Y. Please refer to Form 4770.

● "KARBATE" GLOBE-TYPE VALVES

A "Karbate" globe-type corrosion resistant valve is now being manufactured by the National Carbon Company, Inc. Through addition of the valve to its list of products for the chemical and process industries, National Carbon has made it possible to install complete conveying and heat transfer systems constructed entirely of "Karbate" chemically inert materials.

Karbate Globe-type Valve



The new globe-type valves, like "Karbate" tanks, heat exchangers, pipes, fittings, towers, and pumps, are said to be resistant to practically all corrosive chemicals and are unaffected by extreme thermal shock.

The valves are available in 1 in. and 2 in. sizes. Tested to withstand 50 pounds pressure, they are small and lightweight, with short face to face dimensions. "Karbate" valves are of graphite stock and are self-lubricating. The inert chemical properties of the material prevents corrosion-caused sticking of the moving parts, thereby cutting down the maintenance normally required to keep valves operating at full efficiency, it is stated.

"Karbate" valves are equipped with adapter plugs for steam-heating those fluids that tend to crystallize or solidify when handled through unheated lines. Utilization of the adapter plugs for steam-heating the valve will prevent clogging and avoid shut-downs while valves are dismantled and cleaned.

● PRODUCTION AND PROCESSING OF RAMIE

Clarence R. Bitting, president of the United States Sugar Corp., recently announced consummation of a joint venture agreement with Newport Industries, Inc., of Pensacola, Fla., covering the production and processing of ramie.

Approximately 1,500 acres along the West Palm Beach Canal, near Canal Point, will be devoted to the culture of the crop. Nearby such plantings will be built a commercial size plant for the preparation of the fiber.

"For some years the Sugar Corporation has been conducting agricultural studies in connection with this valuable fiber crop and at the same time Newport Industries has been studying how best to process and market the crop," Mr. Bitting said.

"It was but a natural sequence that these two Florida enterprises should join their efforts to develop a new crop which may well mean the employment of thousands of persons and thousands of acres. The agricultural activities will be directed by the Sugar Corporation and the processing activities will be under the direction of Newport," he explained.

"Ramie is one of the finest natural fibers, having both strength and luster, and is adapted to many uses in various fields of enterprise. The utilization of by-products will, of course, be given the same thorough consideration that is now given to by-products of other crops in the Everglades. With successful development of mechanical methods in both the culture and processing of this crop, it is possible that entirely new markets of vast potentialities will be opened," Mr. Bitting declared.

● ELECTED PRESIDENT, BAKELITE CORP.

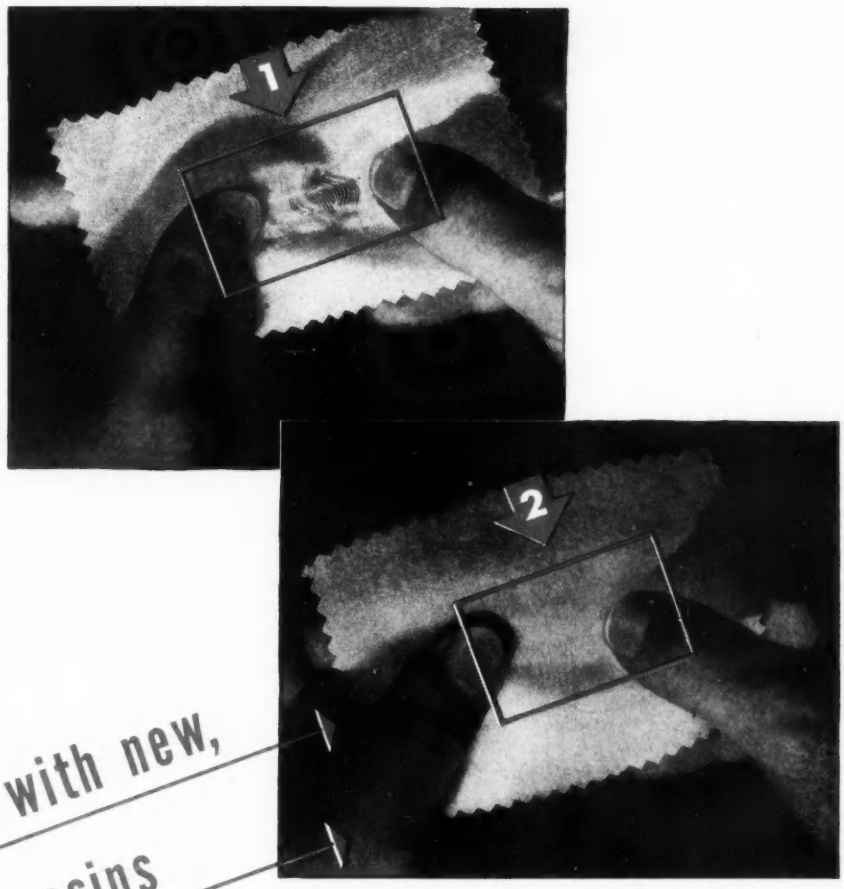
James W. McLaughlin has been elected President of the Bakelite Corporation, a unit of Union Carbide and Carbon Corporation. Mr. McLaughlin was granted the degree of Bachelor of Science in Mechanical Engineering by the University of Illinois in 1914. After a short experience as an engineer with Peoples Gas Light and Coke Company in Chicago, he entered the employ of The Prest-O-Lite Company, Inc. He has been in charge of major production operations in the Industrial Gases and Chemicals companies of the Corporation continuously since that time. Mr. McLaughlin will direct all of the plastics operations of units of the Corporation, including the Plastics Division of Carbide and Carbon Chemicals Corporation.

James W. McLaughlin

● IRON AND STEEL RELIEF VALVES

A proposed simplified practice recommendation for iron and steel relief valves for petroleum, chemicals, and general industrial services, has been submitted to producers, distributors, users, and others interested for approval or comment, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. These valves are primarily intended for air, gas, vapor and liquid service requirements for oil refineries, gasoline plants, synthetic rubber projects, chemical plants and also for general industrial service.

Mimeographed copies of the proposed simplified practice recommendation may be obtained upon request to the Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C.



SLIP-PROOFING with new, inorganic resins

BOTH these swatches of a lightweight rayon came from the same bolt . . . yet simply rubbing them between your fingers would reveal a startling difference in slippage.

As in the photograph (1) above, the threads of one would separate easily . . . The second would be unaffected.

Put them both through the much more exact A.S.T.M. test for seam slippage . . . and the second swatch would rate at least 50% better than the first.

The second swatch has been slip-proofed with Syton W-20, one of a group of new finishing agents with fascinating possibilities developed by Monsanto textile laboratories.

Specifically, the Sytons are colloidal solutions of polymerized silica, or, in simpler terms, colloidal quartz. When as little as 1% of these amazing inorganic resins is deposited on the individual fibres of silks, nylons, rayons or cottons, slippage is reduced by 50% and more.

The Sytons are effective on a wide range of fabrics, from dress fabrics to sheer hosiery. They can be applied to fabrics in existing mill equipment and are well adapted to present mill practices.

In short, the Sytons are another practical step forward toward *better* fabrics . . . at *lower* production costs . . . through the closer partnership between chemicals and textiles.

As with other, equally promising new Monsanto products for tomorrow's textiles, the Sytons will not be offered for general commercial use until they have been thoroughly proved in mill trials . . . If you are particularly interested in slip-proofing, however, we will be glad to discuss the possibility of arranging trials in your mill on your particular fabrics . . . Simply write or wire: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Massachusetts.

Divisions cooperating in Monsanto textile research in addition to Merrimac Division include: Central Research Laboratories at Dayton, Ohio; Organic Chemicals Division and Phosphate Division at St. Louis, Missouri; Plastics Division at Springfield, Massachusetts.

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WANTED: A demonstrator-salesman for the textile specialties with experience in the textile processing to represent an old established but progressive manufacturer. Advise age, experience and qualifications. Box 573.

WANTED: Salesman by a New Jersey Manufacturer of Boil-off compounds and textile finishes. Salary and commission. State qualifications and draft status. Box 576.

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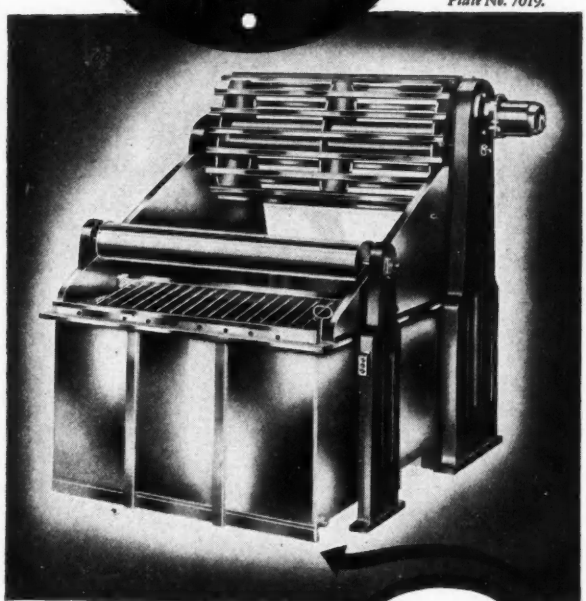
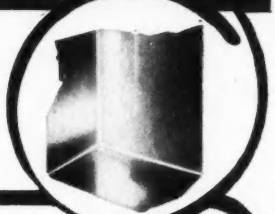


Round corner construction . . . no crevices into which old colors can seep.



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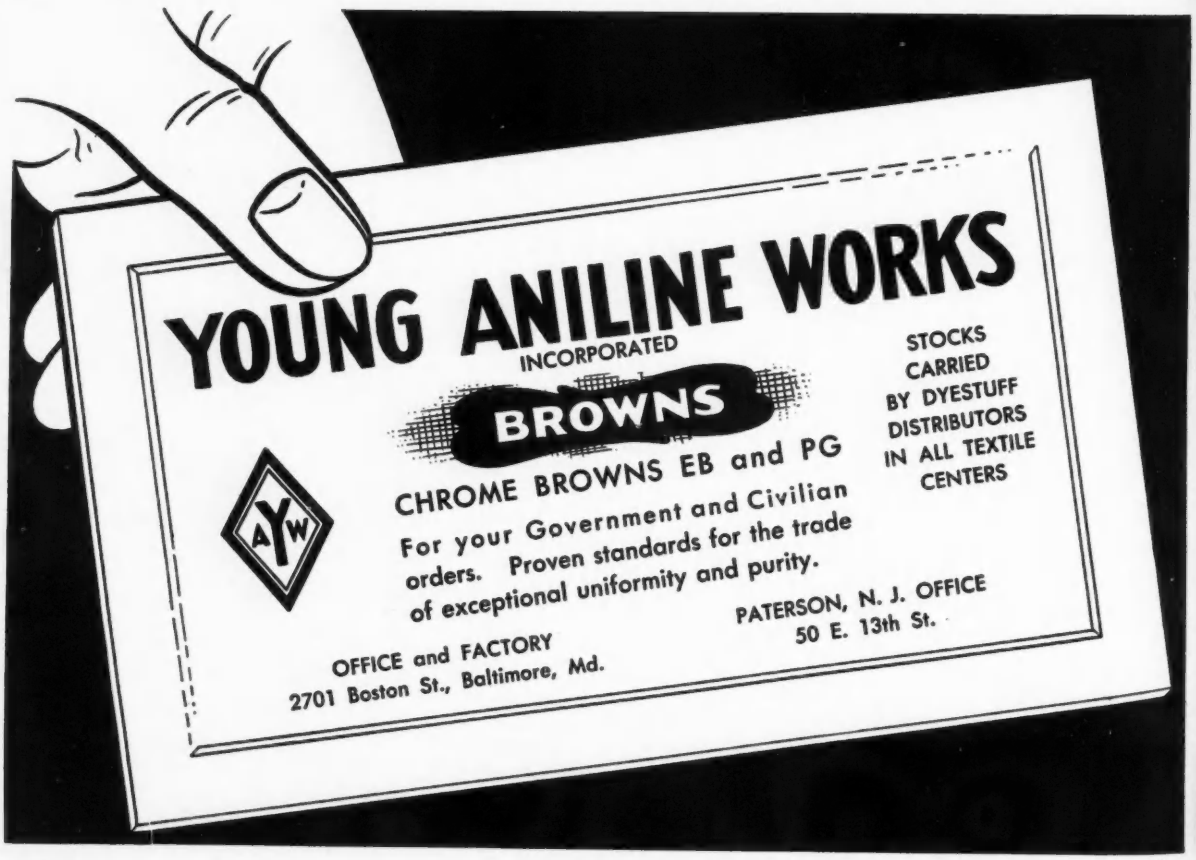
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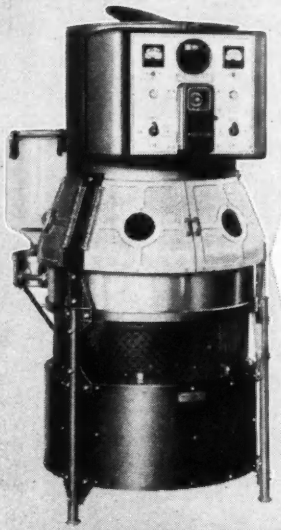

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You're wrong there, lady. Good merchants appreciate customers who keep an eye on ceiling prices, who don't ask them to buy on the black market, who never ask for rationed goods without points, who share and play square with scarce goods.

..."It's too much trouble"

It isn't a lot of trouble to do the little the Government asks—just remember to ask every time you make a purchase, "Is this the ceiling price?" And it's well worth the trouble—if it holds prices down, lessens the danger of inflation.

"We can afford to pay more"

Maybe *you* can, but how about the millions of soldiers' families who must live on Army allotments? Every time you pay black market prices or buy rationed goods without points, you're helping to send prices up—that's the way inflation comes. And *nobody* can afford inflation.

"My store doesn't display ceiling prices"

All retailers will if you keep asking them, "Is this the ceiling price?" It's the law. Ceiling prices must be displayed wherever goods under ceilings are sold. That's the system which has helped to keep prices so much lower in this war than they were in the last.

"I just don't want to do it"

No—and our boys don't want to fight! But they're doing it—magnificently! It's up to you on the home front to do your part to head off rising prices and inflation, help prevent producing a depression for our boys to come home to. Don't be a SABOTEUR on the home front!

Check and be proud! You should be proud if you're the kind of loyal, patriotic American citizen who never pays more than ceiling prices, who pays her ration points in full, who shares and plays square with scarce goods!

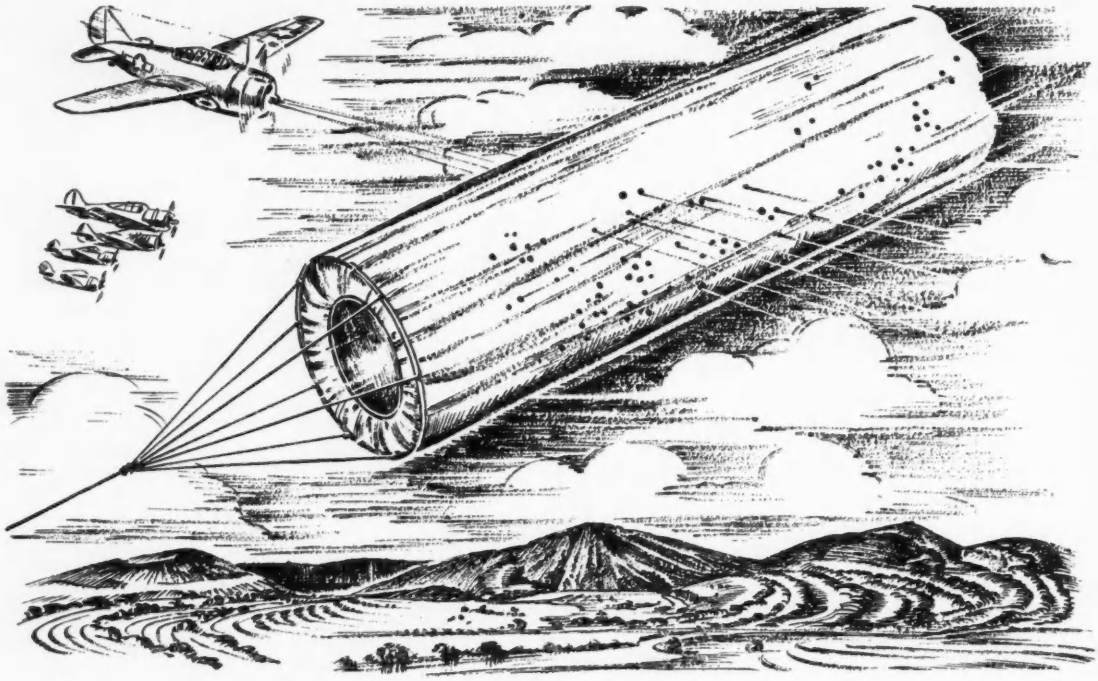
It is because of you and millions of women like you—cooperating with American merchants—that the cost of living has gone up only 7 per cent since your Government's price control started.

But the end is not yet. So keep up the good work. Ask *every time*—"Is this the ceiling price?" Never buy a single thing that you can do without. Save your money—in the bank, in life insurance, in War Bonds. When you use things up, wear 'em out, make 'em do, or do without . . . you're helping to HOLD DOWN PRICES!

YOUR STORE WILL BE GLAD TO HAVE YOU ASK:

"Is this the ceiling price?"

A United States War Message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.



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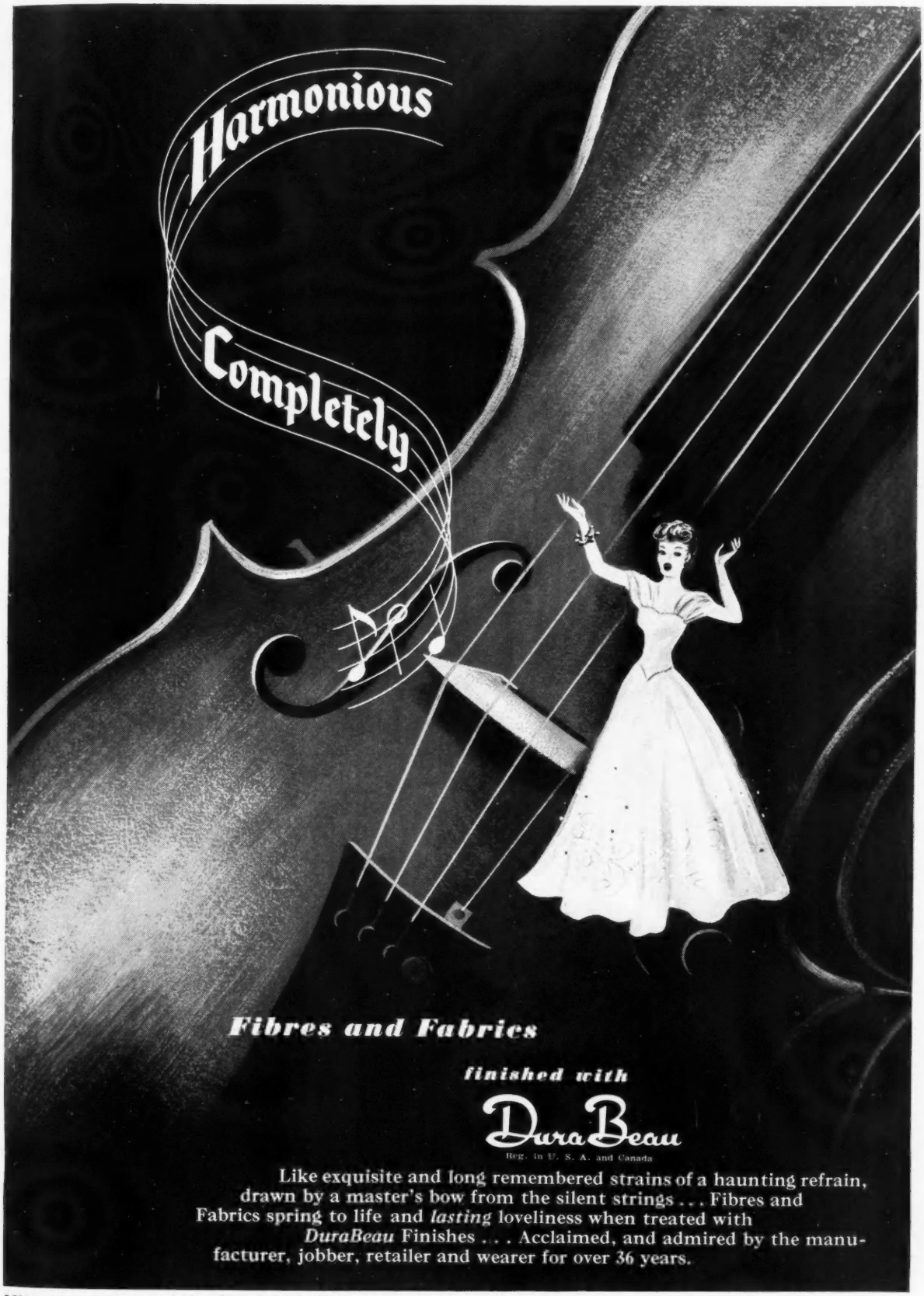
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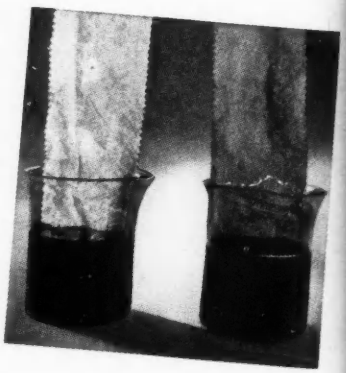
Write to Cyanamid for more complete information on the DECERESOL Wetting Agents. Our representative will gladly assist you in using them to the best advantage.



DECERESOL OT has excellent dye levelling properties. "Grey" cotton fabric (left) dyes unevenly. A dye solution containing 0.05% DECERESOL OT 100% (right) produces uniform, level dyeing.

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